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ANNUAL REPORTS

OF THE

WATER COMMITTEE,

THE

WATER COMMISSIONER,

THE

WATER REGISTRAR,

AND THE

CITY ENGINEER,

OF THE

CITY OF WORCESTER,

FOR THE YEAR ENDING NOVEMBER 30, 1874.

WORCESTER:
PRINTED BY CHARLES HAMILTON,
PALLADIUM OFFICE.
1875.

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1898.

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VIIA

ANNUAL REPORT

OF THE

COMMITTEE ON WATER.

To the Council of the City of Worcester :—

An ordinance of the city requires a report from the Joint Standing Committee on Water, accompanied by the reports of the Water Commissioner and Water Registrar, for the year ending November 30, 1874.

The report of the Registrar indicates an unwarrantable consumption of Water in the absence of meters, and in view of this fact the Committee will deem it their duty to require meters to be placed wherever gross wastefulness is tolerated. The Commissioner and Registrar are directed to use every means in their power, consistent with the authority imposed in them by the ordinances of the city, to compel a proper use of water.

METERS.

The subject of meters has claimed the attention of the Committee at nearly every meeting during the year. A pressure had been brought to bear upon the several Water Committees for three or four years past to recognize a meter patented and manufactured by Wm. E. Desper, of this city, and it was adopted by the Committee of 1873. Its very unsatisfactory character caused the Committee to withhold its approval, and to cease reading them, as they failed to do the work required of them. The failure of this meter is undoubtedly known to the patentee, as it is understood that none have been manufactured the present year.

The abandonment of this meter brought no relief to the Committee; a new one, introduced by H. A. Desper, has claimed their attention. But three or four have been in operation within the knowledge of the Committee, and not all of these are working satisfactorily. In view of the very limited test, both in time and numbers, your Committee were not justified in giving it equal recognition and approval with that of the Ball and Fitts meter. Another reason existed for delaying this approval. The Committee were assured by the Union Water Meter Co. that the *new* Desper meter was an infringement upon theirs, and that its adoption by the city would bring an injunction against its use.

The Committee deemed it for the interest of the city that some other party should test this point.

The present water main through Main street, from Front street to Thomas street, is but six (6) inches in diameter; from Thomas street to Lincoln square, but four (4) inches in diameter, and these pipes from their long use and accretions of rust, have not the capacity that their size would indicate. The great increase in the consumption of water on Prescott street demands a larger pipe through that street.

The burning of the Street Railroad stables and of "All Saints" church on Pearl street, indicated our weakness in those localities, and your Committee would recommend that larger pipes be substituted for the present ones from Front street through Main street to Lincoln square, thence to the manufactory of "Ames Plow Company," on Prescott street. The same difficulty exists on Grafton street, from Washington square to Providence street, where it is recommended a twelve (12) inch pipe be substituted in place of the present four (4) inch pipe.

WATER SUPPLY.

Your Committee feel that the trust imposed in them would not be answered did they not urge upon the City Council the importance of a decision regarding a further supply of water. The limited quantity now in store makes it possible that it may be exhausted before rains come. It would work hardship, deprivation and danger to the community, that can hardly be realized, and when the investigations of the Committee show that a supply ample for the needs of the city for many years to come, may be obtained by so reasonable an outlay, they think it would not be a wise economy that advises inaction. Their investigations to this end resulted in the conviction that Mill Brook and North Pond furnished an ample supply, much more easily and economically acquired than from any other source. There are but five (5) mill owners upon the stream, and the rights in the reservoir or North Pond are vested in but four (4) parties in nearly the following proportions, viz:—

Stephen Salisbury, 4-10; J. M. Daniels & Son, 2-10; City of Worcester, 3-10; A. C. Buttrick, 1-10.

North Pond is situated two (2) miles from the city; sixty (60) feet above Lincoln square, and has an area of two hundred and thirty (230) acres. It will store 700,000,000 gallons, and has a water-shed that would guarantee 7,000,000 gallons per day. The power derived from the water used for flushing sewers would pump a large amount into the present system of pipes, or into Bell Pond, a natural reservoir that will contain at least 15,000,000 gallons, from which distributing pipes are already laid; but beyond this question of a supply of water for the uses of the people, the city should obtain the *entire* control of that reservoir for the following reasons:

1st. That it might erect and maintain such a dam and such safeguards as should effectually quiet the fears of a breaking away that have haunted many a house for the past fifteen years, and not without reason.

2d. The statutes give the city the authority to take these water rights at any time. (This is an incumbrance upon the property of the mill-owners that they may with great propriety ask the city to remove, either by purchase or the abandonment ot the right).

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CITY OF WORCESTER,

FOR THE YEAR ENDING NOVEMBER 30, 1874.

WORCESTER
A TOWN JUNE 14.1722 A CITY FEBY 29.1848.

WORCESTER:
PRINTED BY CHARLES HAMILTON,
PALLADIUM OFFICE.
1875.

PUBLIC

SCHEDULE OF PIPE LAID IN 1874.

STREET.	LOCATION.	Size of Pipe.	Feet of Pipe.	Gate.	Hydrants.
Mill and Newton,	From Leicester street to Pleasant,	16	8,000	5	7
May,	" Newton to Woodland,	12	1,366	2	
Belmont,	" Bell Pond to land of State Hospital	12	1,754	2	1
Cambridge,	" Southbridge to Chelsea,	12	541	1	2
Lovell,	" Newton street,	12	63	1	1
Southbridge,	" Cambridge to College,	8	1,483	2	
Chelsea,	" Cambridge to Crompton street,	8	506	1	1
Southgate,	" Southbridge to Gardner,	8	1,073	2	
Channing,	" Catharine street South,	6	350	1	
Clifton,	" May street South,	6	781	1	
Agricultural,	" Highland street to Sunnyside,	6	1,030	2	1
Jefferson,	" Vernon to Columbia,	6	970	1	
Columbia,	" Jefferson street,	6	198	1	
Florence,	" Maywood street North,	6	372	1	
Queen,	" King to Davis street,	6	562	2	
College,	" Southbridge to entrance to College	6	543	2	
Reservoir,	" Eastern avenue West,	6	68	1	1
Kingsbury,	" Woodland street East,	4	393	1	1
Ledge,	" Waverley street North,	4	321		1
Queen,	" Kingsbury street to King,	4	329		
Meade,	" Lamartine street South,	4	394	1	
Mt. Vernon Place,	" Harrington ave. to Mt. Vernon st.	4	304	2	
Auburn Place,	" Catharine street South,	4	336	1	1
Hope Cemetery,		4	876		
Leicester,	Taken up and relaid,	16	330	2	
State Hospital,	Laid and paid for by them,	8	2,886	1	
State Hospital,	" " " "	4	24		
Holy Cross College	" " " "	6	1,177	1	1
			27,030	37	18

Number of leaks repaired, 108: On main pipe,—joints, 54; rust, 20; split, 3; soldered branch, 5; branch, 1; settling of earth, 1; cap, 1; rivet, 2; quarter turn, 1; plug, 1; hydrant valve, 3; hydrant bowl, 1 defective gate, 1. On service pipe,—lead connection, 7; tee, 1; packing, 1; broken stop, 2; bowl joint, 3. Stoppages in service pipe reported, 64.

INVENTORY OF STOCK AND TOOLS ON HAND DECEMBER 1, 1874.

13	pieces 20 inch cast iron pipe,
34	pieces 16 inch cast iron pipe,
159	pieces 12 inch cast iron pipe,
23	pieces 8 inch cast iron pipe, class B,
128	pieces 8 inch cast iron pipe, class A,
120	pieces 6 inch cast iron pipe,
12	feet 24 inch cast iron pipe,
5	feet 20 inch cast iron pipe,
78	feet 16 inch cast iron pipe,
45	feet 12 inch cast iron pipe,
45	feet 8 inch cast iron pipe,
100	feet 6 inch cast iron pipe,
50	feet 4 inch cast iron pipe,
250	feet 6 inch cast iron pipe, been used,
50	feet 4 inch cast iron pipe, been used,
1,810	feet 15 inch unlined pipe,
210	feet 12 inch cement lined pipe,
1,596	feet 10 inch cement lined pipe,
2,912	feet 8 inch cement lined pipe,
84	feet 6 inch cement lined pipe,
147	feet 4 inch cement lined pipe,
462	feet 3 inch cement lined pipe,
504	feet 2 inch cement lined pipe,
15	feet 2 inch galvanized iron pipe,
72	feet 20 inch cement lined pipe, been used,
137	feet 16 inch cement lined pipe, been used,
107	feet 12 inch cement lined pipe, been used,
273	feet 10 inch cement lined pipe, been used,
2,783	feet 4 inch cement lined pipe, been used,
2	20 inch curve pieces,
6	16 inch curve pieces,
2	16x16 three way branches,
2	16x12 three way branches,
2	16x8 three way branches,
12	16x6 three way branches,
4	16x4 three way branches,
7	12x8 three way branches,
5	12x6 three way branches,
2	12x4 three way branches,
1	10x6 three way branch,
2	10x4 three way branches,
13	8x8 three way branches,
34	8x6 three way branches,
10	8x4 three way branches,
32	6x6 three way branches,
18	6x4 three way branches,
40	4x4 three way branches,
4	16x12 four way branches,
3	12x6 four way branches,
3	8x8 four way branches,
2	8x6 four way branches,
11	6x6 four way branches,
1	4x4 four way branch,
10	8 inch one-eighth turns,
6	6 inch one-eighth turns,
16	4 inch one-eighth turns,
2	16 inch quarter turns,
3	12 inch quarter turns,
6	8 inch quarter turns,
2	6 inch quarter turns,
3	4 inch quarter turns,
1	2 inch quarter turn, brass,
29	set sleeves for 16 inch cement lined pipe,
32	set sleeves for 12 inch cement lined pipe,
24	set sleeves for 10 inch cement lined pipe,
29	set sleeves for 8 inch cement lined pipe,
15	set sleeves for 6 inch cement lined pipe,
23	set sleeves for 4 inch cement lined pipe,
13	set sleeves for 3 inch cement lined pipe,
40	set sleeves for 2 inch cement lined pipe,
14	sleeves for 24 inch cast iron pipe,
3	sleeves for 20 inch cast iron pipe,
4	sleeves for 16 inch cast iron pipe,
5	sleeves for 12 inch cast iron pipe,
31	sleeves for 8 inch cast iron pipe,
12	sleeves for 6 inch cast iron pipe,
3	sleeves for 5 inch cast iron pipe,
14	sleeves for 4 inch cast iron pipe,
1	sleeve for 3 inch cast iron pipe,
7	set ½ sleeves for 12 inch pipe with bolts,
10	set ½ sleeves for 8 inch pipe with bolts,
1	20x16 inch taper,
10	12x8 inch tapers,
14	8x6 inch tapers,
18	6x4 inch tapers,
2	4x3 inch tapers,
3	4x2 inch tapers,
2	24 inch bonnets,
1	16 inch bonnet,
2	12 inch bonnets,
16	8 inch bonnets,
27	6 inch bonnets,
11	4 inch bonnets,
12	12 inch plugs,
4	8 inch plugs,

7 6 inch plugs,
1 16 inch gate,
1 16 inch gate, Ayres,
3 12 inch gates,
1 10 inch gate,
13 8 inch gates,
11 6 inch gates,
22 4 inch gates,
4 gate boxes,
7 gate box frames,
4 gate box covers,
25 gate box covers,
6 gate box frames and covers, small,
14 flush hydrants,
4 New Haven hydrants, been used,
4 post hydrants, been used,
12 post hydrant boxes,
31 flush hydrant box frames and covers,
16 hydrant wastes,
15 hydrant bowls,
4 pieces cast iron pipe for hydrant bowls,
216 lbs. iron bands for repairing solder branches,
895 lbs. wrought iron bands and bolts for street branches,
40 feet 3 inch steam pipe,
300 feet 1¼ inch steam pipe,
800 feet 1 inch cement lined pipe,
956 feet ¾ inch cement lined pipe,
9,310 feet 1 inch unlined pipe,
455 lbs. 2 inch lead pipe,
790 lbs. 1 inch lead pipe,
470 lbs. ⅝ inch lead pipe,
128 lbs. solder,
69 1 inch lead connections,
32 ⅝ inch lead connections,
67 ½ inch lead connections, been used,
2 3 inch globe valves,
2 1 inch Ludlow gates,
3 ¾ inch Ludlow gates,
62 ½ inch stops for bands,
31 ¾ inch waste stops,
30 ½ inch waste stops,
45 cast iron stop boxes and covers,
6,511 lbs. tapping bands,
142 lbs. wrought iron bands,
687 lbs. bolts and nuts for service pipe,
30 bolts for 24 inch sleeve,
28 1¼ inch brass tees,
204 1 inch brass tees,
23 1 to ¾ inch rubber coated tees,
6 2 inch plain iron tees,
22 1 inch plain iron tees,
26 1 to ¾ inch plain iron tees,
21 2 inch plugs,
30 1¼ inch plugs,
104 1 inch plugs,
246 ¾ inch plugs,
15 1 inch thimble couplings,
17 ¾ inch thimble couplings,
90 ½ inch thimble couplings,
12 2 inch malleable iron unions,
12 1 inch malleable iron unions,
7 2 inch rubber coated unions,
8 1 inch rubber coated unions,
2 1 inch brass unions,
3 ¾ inch brass unions,
3 2 inch rubber coated elbows,
3 1 inch rubber coated elbows,
25 2 inch rubber packings for tapping bands,
98 1 inch rubber packings for tapping bands,
325 ½ inch rubber packings for tapping bands,
2 4 inch meters,
4 1 inch meters,
3 ¾ inch meters,
1 1 inch Worthington meter,
1 ⅝ inch Worthington meter,
3 meter box frames and covers,
10 bbls. Portland cement,
94 lbs. cement,
1 Knowles rotary pump,
1 Knowles small steam pump,
1 Knowles large steam pump,
2 force pumps,
2 copper pumps,
6 tool boxes and 3 chests,
13 wheelbarrows,
55 picks,
9 pick handles,
57 shovels,
13 iron bars,
8 iron tampers,
10 striking hammers,
6 stone hammers,
13 hand hammers,
1 paving hammer,
16 hammer handles,
125 lbs. steel in drills,
18 hand drills,
9 iron spoons,
4 ladles,
2 small ladles,
52 cold chisels,
28 steel sets,
5 packing urns,
4 furnaces,
18 monkey wrenches,
15 Baxter wrenches,
3 pair 1½ inch pipe tongs,
5 pair 1¼ inch pipe tongs,
3 pair 1 inch pipe tongs,
3 pair ¾ inch pipe tongs,
2 pair ½ inch pipe tongs,

1 pair ⅜ inch pipe tongs,
6 hand axes,
3 axes,
1 adze,
7 hand saws,
2 bit stocks and bits,
1 saw set,
2 try squares,
2 planes,
1 drawing knife,
2 grind-stones,
1 oil stone,
1 screw driver,
1 hoe,
1 spirit level,
13 brooms,
4 Stanwood's pipe cutters,
5 pipe taps, from ½ to 2 inch,
7 die plates and 20 dies,
6 packed drill stocks and 20 drills,
1 drill stock and drill for drilling iron pipe,
13 stop wrenches,
10 gate wrenches,
7 hydrant wrenches,
3 wrenches for repairing hydrants,
Lot of tools for building hydrants,
1 platform scale,
18 sets cones for lining pipe,
4 rubber cones,
3 wagons,
1 sleigh,
1 harness,
2 hand-carts,
3 derricks,
2 sets pulley blocks and ropes,
35 water pails,
8 dies for cutting packing,
1 ratchet and drills,
3 pair tongs for lifting pipe,
14 long-handled forks,
2 scythes and snaths.

MISCELLANEOUS.

5,500 feet chestnut lumber,
730 lbs. wrought iron rods,
139 lbs. old brass,
3,157 lbs. pig lead,
3,000 lbs. old lead,
20 lbs. white lead,
535 lbs. chains,
307 lbs. rosin,
29 pickets for reservoir fence,
11 pair rubber mittens,
2 cast iron sinks,
4 stoves,
14 jack screws,
2 desks,
4 office chairs,
5 window frames,
3 platforms for holding pipe,
4 oil cloth suits,
1 canvas tent and frame,
40 lbs. rubber packing cloth,
5 yards enamelled cloth,
867 lbs. hemp packing,
20 lbs. steam packing,
57 lbs. winding twine,
17 lbs. hemp twine,
6 bbls. charcoal,
1 goose-neck,
100 feet ¾ inch rubber hose,
5 tea kettles,
1 anvil,
1 portable forge,
2 fan blowers,
3 iron vises,
2 wood vises,
3 pair shears,
1 cast iron frame for screen,
1 mud boat,
1 drinking fountain,
1 stand pipe for filling water cart,
1 ton coal,
1 handle basket,
4 carpenters' horses,
6 steam gauges,
9 oil cans,
11 brass screws for gates,
2 brass screws for hydrants,
11 nozzles for hydrants,
10 hydrant caps,
7 brass tops for hydrants,
150 lbs. post hydrant box hoops,
46 lbs. post hydrant box fastenings,
5 nuts and taps for Boston hydrants,
250 feet ⅛ inch gas pipe for thawing service pipe,
3 galvanized iron boilers,
1 copper boiler,
2 boilers for thawing hydrants,
1 tank for testing meters,
1 pr. tongs for repairing hydrants,
1 truck,
2 hand-sleds,
5 mixing boxes,
26 pair rubber boots,
Patterns for pipe, branches, gates and hydrant box frames, &c.,
2 spoons for cleaning stop boxes,
6 hooks for removing hydrant wastes,
1 coal hod,
80 lanterns,
3 oilers,
1 powder can,
6 trowels,
3 soldering furnaces and tools,
6 files,
2 pair plyers,
2 paving rammers,
5 hay knives,

LOCATION OF HYDRANTS.

Abbott st., north-west cor. Chandler st.
Agricultural st., south-west cor. Joe Bill road.
Arch st., north-east cor. Orchard st.
Ash st., north-west cor. Summit st.
Assonet st., east side, front of No. 16, 100 feet south of Gold st.
Austin st., south side, opp. High st.
" " south-east cor. Irving st.
" " south-east cor. Oxford st.
" " north side, front of No. 88.
" " south side, front of No. 103.
" " south side, opp. Quincy st.
" " south-east cor. Newbury st.
" " south-west cor. Piedmont street
" " south-side, opp. No. 172, west of Russell st.
Barclay st., north-west cor. Harrison street.
Barclay street, north-west cor. Ætna street.
Beach st., west side, opp. Brown st.
Beacon st., south-east cor. Lagrange street, at steamer house.
Beacon st., north-east cor. Orcad st.
Benefit st., north side, opp. Mount Pleasant st.
Benefit st., north-east cor. Beacon st.
Benefit ct., in centre of court, at south end.
Belmont st., south-west cor. Orchard street.
Belmont st., north-west cor. Oak av.
" " north side, opp. Adams street.
Blackstone st., north-east cor. Charles street.
Blackstone st., north-east cor. Howard street.
Blackstone st., north-east cor. Bridge street.
Bloomingdale road, in front of Washburn Iron Co.'s Rolling Mill.
Bloomingdale road, opp. south-east cor. B. & A. freight depot.
Blossom st., north side, front of No. 8.
Bluff st., north-west cor. Bellevue st.
Bowdoin st., north side, opp. Chestnut st.
Bowdoin st., south side, opp. No. 16.
Bowdoin st., south side, front No. 23.
" " south-east corner North Ashland street.
Boynton st., south-west cor. of Joe Bill road.
Bridge st., south-east cor. Mechanic st.
Cambridge st., north side, opp. Chelsea street.
Canal st., south-west cor. Cherry st.
Carroll st., east side, opp. Arch st.
Castle st., south-east cor. Valley st.
Catharine street, north-west corner Westminster street.
Catharine street, south-west corner Channing street.
Cedar st., north-west cor. Everett st.
" " north side, between Everett and Oak streets.
" " south-east cor. Oak st.
" " south-east cor. Fruit st.
Central st., north side, south-east cor. Armsby's building.
Central st., north side, south-east cor. Keyes' moulding shop.
Chandler st., north-east cor. Irving st.
" " north-east cor. Oxford st.
" " north side, opp. Wellington street.
" " north-east cor. Newbury street.
" " south-east cor. Piedmont street.
" " north-east cor. Queen st.
" " north-west cor. Mason st.
" " north side, opp. King st.
Channing st., west side, opp. Luther Ross' house.
Charlotte st., north-east cor. Clifton st.
Chatham st., south-west cor. Houchin avenue.
Chatham st., south-west cor. Irving st.
" " south-west cor. Oxford street.

Chatham st., south-west cor. Crown street.
" " south-east cor. Quincy street.
Chelsea street, north-west cor. Crompton street.
Chestnut st., north-east cor. Pearl st.
" " east side, opp. Cedar st.
" " south-east cor. Sudbury street.
" " east side, opp. William street.
Church st., south-west cor. Mechanic street.
Clinton st., east side, opp. Park.
Columbia street, south side, opposite Blake street.
Congress st., north side, front of S. Bridges' lot, between Crown and Newbury streets.
Coral st., north-west cor. Waverley st.
Coral st., north-east cor. Clarkson st.
Crown st., south-west cor. Congress street.
Cutler st., south-west corner Ætna st.
Dewey st., west side, front of chapel, opposite Austin street.
Dix street, south-east cor. Wachusett street.
Dix st., north-west cor. Goulding st.
Eastern av., east side, opp. Shelby st.
" " north-east cor. Farwell street.
" " south-west cor. Belmont street.
East Central st., south side, front of No. 66.
East Central street, south side, front of No. 94.
East Worcester st., north-east corner Larkin street.
East Worcester st., north-east corner Cross street.
East Worcester st., north-east corner Henry street.
Edward st., north-west cor. Elliott st.
" " south-west cor. Glen st.
" " north-west cor. Newport street.
" " north-west corner Palmer street.
Elizabeth st., west side, opp. Farwell street.
Elizabeth st., south-west cor. Belmont street.
Elliott st., north side, front of No. 17.
Ellsworth st., north side, front of No. 24
Elm st., north side, front of Church of Unity.
" " north side, front of No. 25.
" " north-west cor. Chestnut st.
Elm st., north side, opp. Linden st.
" " north side, front of D. W. Lincoln's estate.
" " north-west cor. Oak street.
" " north-east cor. West street.
" " north-east cor. Fruit street.
" " north-west cor. Sever street.
" " north side, 300 feet west from Sever street.
" " south-west cor. Hudson st.
Exchange st., north side, front of Music Hall.
" " north side, opposite Cypress street.
" " north-west cor. Union street.
" " north side, opp. Blackstone street.
Foster st., north-east cor. Waldo st.
" " south-west cor. Cypress st.
Fountain st., east side, between Arch and Belmont streets.
Franklin st., south side, west of B. & A. railroad.
" " north side, west of Canal.
" " south-east cor. Milk st.
Freeland st., north side, near south-east corner, No. 15.
Front st., north side, front of Crompton's block, west of railroad track.
Front st., north-west cor. Carlton st.
" " north-west cor. Church st.
" " north side, opp. Trumbull st.
" " north side, opp. Bartlett pl.
" " north side, opp. Vine street.
" " north-west cor. Bridge st.
" " north side, near south-east cor. stone block.
" " north-west cor. Summer st.
Fruit st., south-east cor. Cottage st.
Garden st., north-east cor. Nashua st.
" " north side, south-east from B., B. & G. freight house.
Gardner st., south side, front of Tainter's mill.
" " north-west cor. Canterbury street.
Gates st., north side, 400 feet from Main street.
Gold st., north side, opp. Summit st.
Grafton st., south side, front of Bradley's car shop.
" " south-west corner Franklin street.
" " north side, opp. Coral st.
" " north side opp. Penn av.
" " north side, opp. Mendon street.
" ". north-west cor. Wall st.
Grand st., south-west cor. Hollis st.
Green st., east side, opp. Franklin st.

Green st., west side, front of Providence freight house.
Green st., west side, opp. Goddard st.
" " west side, opp. Winter st.
" " south-west cor. Plymouth street.
Green st., north-west corner Gold st.
" " north-west cor. Ash st.
" " east side, south of Crompton's driveway.
Green st., west side, front of Fox Mills.
Grove st., north-east cor. Concord st.
" " north-east cor. Lexington street.
Grove st., east side, near south-west corner of wire mill.
Grove st., east side, near entrance to Washburn & Moen's ship'ng room.
Grove st., near centre of Washburn & Moen's wire mill.
Grove st., near north end of Washburn & Moen's wire mill.
Grove st., east side, north of entrance to cemetery.
Hammond st., north side, front of No. 15.
Hammond st., north-west cor. Beacon street.
Hammond st., north side, opp. Canterbury street.
Hamilton st., north-west corner of Orient street.
Harrington ave., south-east corner Westminster street.
Harrington ave., south side, corner Mt. Vernon street.
Harrington ave., south-east corner Windsor street.
Harrison st., north-west cor. Coral st.
" " north-west cor. Penn av.
" " south-east cor. Blake st.
Harvard st., north-west cor. Sudbury street.
Harvard st., west side, opp. Harvard street court.
Harvard st., south-east cor. George st.
Harvard st., south-west cor. Dix st.
" " west side, opp. State st.
Hermon st., north side, opp. Taylor & Farley's.
Hermon st., north-west cor. Beacon-st.
" " south side, west of railroad, north-east from Junc'n shop.
High-st., north-west corner Chatham street.
Highland st., north side, opp. Harvard street.
Highland st., north side, opp. Lancaster street.
Highland st., south-east corner North Ashland street.
Highland st., north-west cor. West st.
" " north side, opp. Sever street.
Highland st., north-west cor. Dover street.
Home st., north side, opp. Wesby st.
Houghton st., west side, between Grafton st. and Union ave.
Hudson st., north-west cor. Hudson street court.
Jackson st., north-east cor. Harris-st.
" " north-east cor. Beacon st.
" " south side, opp. south-west corner junction shop.
Jefferson st., corner Columbia st.
John st., north side, at head of alley leading to Wachusett st.
John st., north-east corner Wesby st.
Kendell st., south side, opposite Auburn place.
Kendall st., north-west cor. Oak ave.
King st., north-east corner Queen st.
" " south-east cor. Woodland st.
Kingsbury st., north-west cor. Queen street.
Kingsbury st., west side, opposite Shepard st.
Lagrange st., north side, between Main and Beacon sts.
Lake st., east side, opposite Baker st.
" " south-east corner Mill st.
Lamartine st., south side, front of School house.
Lamartine st., north side, opposite Langdon street.
Lamartine st., north side, opposite Lodi st.
Lamartine st., north side, opposite Grosvenor st.
Lamartine st., south side, opposite Sargent st.
Larch st., north-west cor. Russell st.
Laurel st., north-east cor. Hanover st.
" " north-west cor. Carroll st.
" " north-west cor. Edward st.
" " south side, near Eastern avenue.
Ledge st., north-east cor. Waverley st.
Leicester st., east side, opp. Mill st.
" " north side, 100 feet west from Lake st.
Leicester st., front of Hunt's mill.
" " at Darling's mill, in yard.
" " " Wright Bottomly's mill, in yard, east of same.
Leicester st., 3 at Ashworth & Jones' mill.
Leicester st., 2 at James Smith's mill.
" " cor. of road leading to reservoir.
Leicester st., front of W. T. Brown's.

Liberty st., north-west corner Arch st.
“ “ “ “ Glen st.
“ “ west side, opposite Newport st.
Lincoln st., east side, opposite Worcester & Nashua depot.
Lincoln st., north-east corner Linwood place.
Lincoln st., north-east cor. Kendall st.
“ “ east side, opp. Garden st.
“ “ south-east cor. Harrington avenue.
Lincoln st., north-east cor. Forest ave.
Linwood place, south side, front of S. J. Brimhall's residence.
Lunelle st., north-west cor. Lafayette st.
Lyon st., north-east corner Bates st.
Main st., west side, at Lincoln square, north of hay scales.
Main st., north-east corner of court to Court Mills.
Main st., east side, front of No. 57.
“ “ north-east corner Market st. front of Exchange Hotel.
Main st., near north-east cor. School st.
“ “ between School and Thomas sts, front of No. 147.
Main st., east side, north of Thomas st.
“ “ east side, front L. R. Hudson's.
“ “ “ “ corner Layard place.
“ “ south-east corner Central st.
“ “ north-east cor. Exchange st.
“ “ front of north-west corner of Mechanics Hall.
Main st., front of south-west corner Union block.
Main st., north-east corner Foster st.
“ “ east side, opposite Elm st.
“ “ north-east cor. Mechanic st.
“ “ east side, opp. Pleasant st.
“ “ “ “ opp. north-west corner of Old South Church.
Main st., north-east corner Park st.
“ “ east side, opp. Chatham st.
“ “ north-east cor. Allen court.
“ “ front of south end of Scott's block.
Main st., north-east corner Myrtle st.
“ “ north-east cor. of Madison st.
“ “ east side, front of No. 674.
“ “ north-east cor. Charlton st.
“ “ north-west corner Wellington st.
Main st., north-east corner Hermon st.
“ “ “ “ Benefit st.
“ “ “ cor. Hammond st.
“ “ east side, opp. Claremont st.
“ “ “ “ “ Downing st.
“ “ “ “ “ Beaver st.
“ “ north-east corner Tirrell st.
Main st., east side, at north-east corner L. Coes' estate.
Main st., at Webster square.
Manchester st., south side, opposite C. Baker & Co.'s lumber yard.
Manchester st., south-west corner Bridge st., at Russ & Eddy's shop.
Maple st., west side, near corner Maple place.
Mason st., west side, opposite school house.
May st., south side, front of No. 19.
“ “ south-east cor. Woodland st.
Maywood st., north side, west of Woodland st.
Mechanic st., south side, front of Crompton's block.
Mechanic st., north side, in depot platform.
Mechanic st., south-west corner Carlton st.
Mechanic st., south side, near steamer house.
Mechanic st., south-west c. Church st.
“ “ “ “ Spring st.
Mendon st., west side, opposite No. 13.
Merrick st., south-west cor. Larch st.
Mill st., east side, front of A. G. Coes' barn.
Mill st., east side, at Newton st.
Millbury st., north-west corner of Lamartine st.
“ “ west side, opp. Foyle st.
“ “ north-west corner Lafayette st.
“ “ north-west corner Ellsworth st.
“ “ north-west corner Sigel st.
“ “ west side, opp. Worth st.
Mulberry st., south-east corner Mulberry st. court.
“ “ west side, front of Lunatic Asylum.
Myrtle st., north side, near south-east corner Stevens' block.
“ “ north-west corner Portland street.
Newbury st., south east corner Congress st.
“ “ south-east corner Chatham st.
Newton st., south-east corner Pleasant st.
“ “ east side, front of No. 11, between Pleasant and Chandler sts.
“ “ north-east corner Chandler st.
“ “ north-east cor. Border st.

Newton st., north-east corner May st.
" " north-east corner Charlotte st.
" " in Square front of L. Coes' shop and opposite Beaver st.
" " east side, opp. Coes st.
Norfolk st., north-east corner Hawkins st.
" " south-east corner Ascension st.
North st., north side, front of No. 45.
" " north-west cor. Milton st.
North Ashland st., north-east corner John st.
" " " north-east corner Home st.
" " " north east corner Dix st.
Orange st., east side, front of No. 28.
" " north-east corner Plymouth st.
" " north-east corner Madison st.
Oread st., north side, at south-west cor. Chas. Wood's estate.
" " north side, east of Beacon st., front of No. 57.
Orient st., north-west cor. Chrome st.
Park st., south side, front of No. 37.
" " south-west cor. Salem st.
" " south-west cor. Orange st.
" " south side, front of Gates' block.
Penn ave., north-west corner Clarkson st.
" " north-west cor. Ætna st.
Piedmont st., east side, between Main and Chandler streets.
" " north-west cor. Larch st.
Pink st., west side, front of Nos. 16 and 18.
Pleasant st., north side, front of Rogers' block.
" " north side, near front of Dr. J. M. Rice's block.
" " north side, opp. High st.
" " north side, opposite Universalist church.
" " north side, opposite Clinton st.
" " north-west corner Linden st.
" " north side, between Linden and Ashland sts., front of No. 107.
" " north-west corner Ashland st.
" " north side, opposite Crown st.
" " north-east cor. West st.
Pleasant st., north-east cor. Fruit st.
" " north-east cor. Sever st.
" " north side, opposite Merrick st.
" " north-west corner Russell st.
" " north side, opposite Bellevue st.
" " north-east corner Hudson st.
" " north side, opposite Abbott st.
Plymouth st., north side, opposite Assonet st.
Pond st., north-west cor. Beach st.
" " north-west corner of right angle in Pond st.
Portland st., east side, front of No. 28.
" " north-east corner Madison st.
Prescott st., north-west corner Concord st.
" " north-west corner Lexington st.
" " east side, opposite south end of Washburn and Moen's.
" " east side, between Warren Thread Co.'s and Richardson's shop.
" " west side, at corner Washburn's and Moen's driveway, near bridge.
" " north-east corner Prescott st. place.
" " north-east corner Redding court.
" " south-east cor. North st.
Prospect st., south side, opposite Hanover st.
" " south side, opposite No. 33.
" " south-west corner Mulberry st.
Providence st., at junction of Providence and Water sts.
" " west side, north-east cor. S. D. Harding's estate.
" " north-west corner of Waverley st.
" " north-west corner Harrison st.
" " near north-west cor. Pattison st.
" " front of No. 104.
" " north-west cor. Winthrop st.
" " south-west cor. Union avenue.
Queen st., west side, opp. Davis st.

Reservoir street, north-west corner Elizabeth st.
" " north-west corner Eastern avenue.
Richards st., west side, 900 feet from Main st.
" " west side, 1,300 feet from Main st., opp. Cleveland's residence.
Salem st., west side, front of No. 23.
" " west side, front of No. 39.
" " north-west cor. Myrtle st.
" " north-west cor. Madison st.
" " front of City stable.
Salisbury st., north side, opposite Boynton st.
" " north side, opposite West st.
" " north side, north of Highland Military Academy.
School street, south side, front of steamer No. 3 house.
Shelby st., north side, front of No. 33.
Shrewsbury st., north-west cor. Mulberry st.
" " north side, front of Dr. Brackett's.
" " at junction of Shrewsbury and East Worcester sts.
" " south-west corner Larkin st.
" " south-east cor. Cross st.
" " south-west cor. Lyon st.
Sigel st., north side, between Millbury and Lodi sts.
Southbridge st., east side, at N. & W. R. R. crossing.
" " south-west corner Madison st.
" " east side, front of No. 128.
" " south-west corner of Salem st.
" " east side, between Salem and Hermon sts., front of No. 180
" " east side, opposite Hermon st.
" " east side, opposite Junction foundry.
" " north-east corner Lafayette st.
" " north-west corner Hammond st.
" " east side, north from No. 390.
Southbridge st., east side, opposite Southgate st.
" " east side, front of No. 456.
" " north-east corner Washburn st.
" " north-east corner Colton st.
" " north-west corner Cambridge st.
Southgate street, south-west corner Grand st.
" " west side, front of school house.
South Irving st., west side, opposite Lovell's court.
State st., south-west corner Main st.
Sudbury st., north-east cor. Eden st.
Summer st., east side, south of Belmont st.
" " east side, front of school house.
" " east side, front of Edw'd Earle's residence.
" " north-east cor. Arch st.
" " east side, opp. School st.
" " west side, opp. Laurel st.
" " south-east cor. Laurel st.
" " south-east corner East Central st.
Summer st., east side, opposite Exchange st.
" " east side, between Charles and Howard sts.
" " east side, between Howard and Bridge streets.
" " south-east corner Fulton st.
" " north-west cor. Mechanic st.
Sycamore street, north-west corner Beacon st.
Temple street, south side, front of No. 57.
Thomas st., south side, front of No. 9.
" " north side, front of No. 58.
" " north-east corner of Union st.
" " north side, east of R. R.
" " north-east cor. Summer st.
Tirrell st., north side, front of No. 11.
Trumbull st., west side, between Front and Park sts.
Union st., at south-west corner Lincoln sq.
" " east side, opp. Court Mills.
" " north-west cor. School st.
" " south-west cor. Thomas st.

Union st., north-west cor. Central st.
" " south-west cor. Exchange st.
" " west side, near centre of Merrifield's building.
" " north-west corner Foster st.
" " west side, opposite Manchester st.
" " under Nashua R. R. bridge.
" " west side, opp. south-west cor. of Rice, Barton & Co.'s shop.
Vernon st., north-east cor. Water st.
" " cor. Winthrop st.
" " north-east cor. Jefferson st.
" " north-east cor. Pattison st.
" " north-east cor. Union ave.
Vine st., north-east cor. Cherry st.
" " north-east cor. Foundry st.
Wall st., south-west cor. Suffolk st.
" " south-west cor. Norfolk st.
Walnut st., south-east cor. Maple st.
Ward st., north-west cor. Foyle st.
" " northwest cor. Taylor st.
" " north-west cor. Richland st.
" " north-west cor. Endicott st.
Washburn st., east side, front of No. 15.
Washington st., east side. opposite Orange st. school-house.
" " north-west cor. Plymouth st.
" " south-west cor. Gold st.
" " north-east corner Spruce st.
" " north-west corner Lafayette st.
Water st., west side, opposite Ledge st.
" " west side, near north end of stone ware manufactory.
" " west side, opp. Harrison st.
Water st., west side, near north-east cor. of Hamilton's tape factory.
" " cor. Green st.
Webster st., west side, front of school-house.
" " opposite driveway between marble shop and Curtis' mill.
" " west side, opposite Curtis ct., south end of mill.
" " west side, opposite north-west cor. cemetery.
Wellington st., north-west cor. South Irving st.
West st., east side, opp. Cottage st.
" " north-east cor. Cedar st.
" " west side, north of Technical school, front of No. 146.
William st., north side, opp. Everett st.
" " south side, opp. North Ashland st.
" " north-east cor. West st.
Winter st., north side, opp. Pond st.
Woodland st., east side, north of Oberlin st.
" " north-east cor. Loudon st.
" " north-east cor. Hawthorn st.
Wyman st., east side, front of No. 18.
Allen's Fire Arms Manufactory, in yard rear of shop.
Ames Plow Co., Salisbury st., stand pipe and hose and Hall's sprinkler.
Adriatic Mills, two hydrants, east of mill, with hose attached in yard.
" " two hydrants in yard west of mill, with hose attached.
" " two places in mill to attach hose.
Bay State Shoe Co., Austin st., in yard, pipe and hose on each floor of shop.
Baker's, Manchester st., pipe with hose attached in centre of building.
B. & A. R. R. freight house, pipe with hose attached.
Buttrick & Whipple, Main st., stand pipe and hose.
Court Mills, cor. Union st., one in court, south of mill.
" " four inch, in building, with hose on each floor.
Crompton's foundry, Mechanic st., hydrant with hose in foundry.
Crompton's Loom Works, Green st., in yard, west of foundry.
Coes' Wrench Shop, hydrant with hose attached at boiler house.
Wm. Dickinson, in yard, hose in building.
Edward Earle, in yard, south-west of house.

Ethan Allen's Estate, Main st., in yard, north of house.
Fox Mills, two hydrants in yard, force pump pipe connected with city water pipe.
C. L. Gorham and Co., Main st., stand pipe and hose.
Gas works, three hydrants in yard.
Heald & Britton, pipe in foundry with hose attached.
A. H. Hammond, Claremont st., hose at east end of barn.
Holy Cross College, hydrant in yard, hose and stand pipe in building.
Industrial School, in yard east of building.
Junction Shop, four hydrants east of building,
" " five pipes in building, with hose attached on each floor.
Keyes' Planing Mill, pipe with hose attached on each floor.
Merrifield's, hydrant with hose attached in engine room.
" Exchange st., pipe in centre of building, with hose on each floor.
" Cypress st., pipe in centre of building, with hose on each floor.
" Foster st., pipe in west wing, with hose on each floor.
Mechanics Hall, pipe in south stairway, with hose attached, one nozzle above the roof.
New York Steam Engine Co., in yard south side of shop.
L. W. Pond, in yard north side of shop.
Providence Engine House, in yard north-east of house.
Rice, Barton & Co., pipe in building, with hose on each floor.
R. Ball & Co., Salisbury st., have hose on each floor.
W. W. Rice, Franklin sq., stand pipe and hose.
State Lunatic Asylum, in yard near south end of building.
State Lunatic Aslyum, in yard near north end of building.
D. Tainter, Gardner st., pipe in tower of mill, with hose on each floor.
Union Water Meter Co., pipe on each floor, with hose attached.
W. A. Wheeler, two in foundry.
Washburn & Moen wire works, hydrants with hose attached.
Washburn Iron Co., rolling mill, hydrant in mill.
Worcester Academy, Providence st., in yard south of building.
Wood, Light & Co., pipe on each floor, with hose attached.
J. H. Walker, Water st., pipe and hose.
Worcester & Nashua R. R. Freight House, two places with hose attached.

REPORT

OF THE

WATER REGISTRAR.

WORCESTER, Dec. 20, 1874.

Gentlemen of the Joint Standing Committee on Water:

IN compliance with the requirements of Section 8 of the "Ordinance relating to Water," I. herewith submit my ***second*** annual Report.

During the year ending Nov. 30, 1874, there were received two hundred and forty-five (245) applications for water, all of which, with but *four* exceptions, have been granted, and the service pipes laid.

The number and amount of water bills rendered to the City Treasurer for collection is as follows:

By Meter,	1,891,	representing	$27,983 68
" Assessment,	7,423,	"	67,548 84
Total,	9,314,	"	$95,532 52

The abatements, the greater part of which were made in consequence of the decision of water takers to pay their water bills by meter measurement, amounted to $11,257.10.

The water has been shut off from the premises of twenty-nine (29) water takers, but in every case it has again been let on, upon the payment of their over-due bills and costs.

There have been attached during the year, three hundred and thirty-six (336) meters, making the total number on the works eleven hundred and seven (1,107), varying in size from ½ inch to 4 inches, as follows:

½in.	⅝in.	¾in.	1in.	1½in.	2in.	4in.
22	695	292	75	15	16	2

The quantity of measured water sold is as follows:—

For *six* months prior to April 1, 1874,	64,048,190 gallons.
" " " " " Oct. 1, 1874,	72,324,670 "

The subject of a further supply of Water being agitated throughout the community, but especially by the City Council, permit me, in view of the experience of our neighbor city, Boston, as well as of other cities, both of this country and Europe, to offer for your consideration a few facts and suggestions.

It is estimated that there is daily delivered through the multitude of outlets of every description in this City, an average of three million gallons of water. The number of people, by actual count, using water, being but a trifle over thirty-six thousand, this amount gives to each individual something more than eighty gallons per day. This quantity could and should be reduced nearly one-half.

Out of the eleven hundred meters attached to the works, more than one-half are upon dwellings occupied by their owners, enabling us to ascertain about what is used by each person in families drawing water so measured. The quantity thus used proving so small, we must conclude that the greater part of our daily supply is drawn at manufactories, blocks and tenement houses, whose owners pay their bills by assessment, and either having no care, allow of a great waste through miserable, worn-out fixtures, or intentionally permit a stream to flow from their pipes to prevent freezing in winter, or in order to obtain cool water in summer.

I consider that there are *three* principal sources of waste: 1st, cheap and worn out fixtures; 2d, hopper water closets; 3d, hose.

Last season I discovered a block of tenement houses occupied by twelve families, each having a faucet from which to obtain a supply, not one of which could by any possibility be turned so as to obstruct the flow of water in the least, so entirely worn out were they. The water had been allowed to run during the entire summer, when the authorities were doing all in their power to obtain a temporary supply for the actual needs of the inhabitants. In another section of the City, scarcely a stone's throw from the City Hall, I discovered in a block of tenements, three faucets in a similar plight, and I was informed that the owner of the estate had known of their condition for more than a twelvemonth, but neglected to have them repaired or new ones substituted.

Another and perhaps the greatest opportunity for waste may be found in almost every dwelling in the "hopper water closet." The experience of those having meters proves conclusively that oftener than all other fixtures, the valve of the "hopper water closet" needs repairing and re-packing. By a careful and detailed comparison in the actual consumption of water by the "hopper water closet" and the "self-acting, or pan water closet" made by the authorities of Boston, but one conclusion can be arrived at, which I trust will have weight with the Committee, knowing as I do that we in Worcester are suffering in a measure from the same cause.

Five experiments were tried, and the verdict I embody herein, entire, as follows:

> "The result of five cases shows, in thirteen closets alone, a total saving of 3,249,739 gallons a year, or a daily saving of 685 gallons, for each closet, at the same time affording all the needed service. In these cases meters are attached, and the water is doubtless shut off at night, showing, in part, that the great waste was in the working hours of the day. But for the meter, which compels the consumer to pay for all the water wasted, as well as used, the estimate of loss above given would be more than doubled. Now, take the whole number of hopper closets, *i. e.*, 16,137, and assume what experience has shown to be within the actual fact, namely, that one closet in *five* is wasting water in the same ratio of the five cases cited, and the total waste will exhibit the amazing aggregate of 4,419,620 gallons in every twenty-four hours."

It has been known for some time, by the Commissioner and myself, that a water closet just out of the passage way, in a certain building on Main street, was wasting water almost constantly. The owner has been repeatedly importuned to remedy it, but this he has failed to do; until recently it has been thought inexpedient to attach a meter in a position to catch the waste, but this will be done at once, and it is hoped the City will receive an equivalent for the large amount of water furnished.

The use of hand hose for irrigation, has of late become so common and the conditions of the ordinance under which its use is sanctioned, has been so almost uniformly abused that some measures should at once be taken, to more effectually control it. Instances that come to my knowledge, of its abuse to the extent of permitting it to run night after night, are not of rare occurrence.

During the year last past, I have called your attention to the advisability of causing every plumber doing business in the City to procure a license. I have since learned that it has been thought absolutely necessary to cause this to be done, in many of our largest Cities, including New York, Brooklyn, St. Louis, Albany, Chicago and Philadelphia, in order to properly and effectually control the attaching and detaching of water fixtures. By changing the forms of plumbers' returns I have in a measure, improved the conditions of their reports, but they are still far from being satisfactory. There is but little that can be done in this department to remedy the evils mentioned, under the present ordinance, but I trust that these suggestions may be the means of causing to be adopted a new ordinance by the City Council, at an early day, that will have a tendency to put a stop to so ruthless a waste of water, as we are aware is taking place in our city daily.

It is my firm conviction, based upon this extended experience of every City with which I have corresponded, that nearly or quite one-third of the entire quantity of water brought into this City might be saved; thereby avoiding the necessity of seeking a further supply for several years to come.

Very much remains to be said upon this subject, but I would refer you to the report of the Water Registrar of Boston, under date of January 7, 1874, together with his supplemental report, embodying the report of the Engineer of the Borough of Liverpool, England, both of which may be found in my office.

Respectfully submitted.

GEORGE D. DAVIS,

Water Registrar.

REPORT OF THE CITY ENGINEER.

To the City Council:

GENTLEMEN :—The following report of the transactions of the Engineering Department for the year ending Dec. 1st, 1874, is most respectfully submitted, to wit:

At the commencement of the year the water in the Leicester Reservoir was level with the top of the rollway. From the 11th of January to the 30th of May, it is estimated that 197½ millions of gallons were wasted.

By raising or lowering the flash-boards the waste was made as small as possible, retaining all the time as much water in the reservoir as could be held with safety. On the first of June the water was two and one-half feet above the rollway—there being stored 775,572,000 gallons. Since then it has been gradually falling, and on the 8th of December was ten feet and two and one-half inches below the rollway, with 317,019,200 gallons.

By raising the dam the five feet which has been contemplated, the capacity of the reservoir would be increased to 895,309,182 gallons.

The question of an additional supply of water has received considerable attention. A survey of the water-shed of North Pond and Weasel Brook has been made, the results of which are stated in the report, to the City Council, of the Hon. Phinehas Ball, dated September 17th, 1874.

A partial examination of Tatnuck Brook shows that its capabilities as a source of supply may have been underrated. It would be a good plan to make some more extended surveys, so that its value may be more definitely determined.

There has been built during the past year 11,412.9 feet of new sewers, with 90 manholes and 38 catch-basins, and 44 catch-basins to old sewers, a tabular statement of which is appended to this report.

The number of permits given to enter sewers by private drains, for the year, is 171.

The whole number of permits given is 1,766.

The total length of sewers now built is 32.82 miles, with 676 catch-basins and 1,345 man-holes. The superintendence of the sewers built by the Sewer Department, the care and maintenance of the sewers already built, and the cleaning of the catch basins, by Gen. R. H. Chamberlain, and the inspection and superintendence of the sewers built by M. R. Edwards, by Asst. Engineer L. A. Taylor, has been efficiently and economically done, and to the entire satisfaction of the Committee on Sewers.

Although much has been done in the way of sewers, much remains to be done. About 340 feet of the Mill Brook sewer, which has been deferred until the removal of the Court Mills, can probably be built the coming year.

The extension of the Piedmont district sewer, which now empties into the old Mill Brook channel, near Sargent's card clothing factory, will require early attention.

An order to construct a large size brick sewer from Sargent street to Cambridge street, was adopted by the City Council, July 6th, 1874.

As the sewer contemplated in said order would not satisfactorily drain a large portion of the land between Southbridge street and Cambridge street, there being but $3\frac{74}{100}$ feet fall between the present outlet of the sewer at Sargent street and the bed of Mill Brook sewer at Cambridge street, and as it seemed to be very desirable that a new street should be laid out and built in connection with such sewer, which street would greatly relieve the public travel from the inconvenience of the railroad crossings on Green street, the Committee on Sewers have deferred building said sewer, hoping that some satisfactory arrangement would be made with the Washburn & Moen Manufacturing Co., by which more fall can be obtained, and that the

City Council would lay out and construct such a street in connection with said sewer.

For the purpose of obtaining more fall, two plans have been proposed. One is to purchase, of the Washburn & Moen Co., three or four feet of their fall at Quinsigamond, and discharge the entire sewerage into the stream at the southerly side of Cambridge street, deepening, if necessary, the present channel, south of said street.

The amount of fall thus taken from the Quinsigamond dam, could be added to the South Worcester privilege by deepening the channel below South Worcester. The other plan is, to construct a dam at South Worcester, which shall divide the waters of Mill Brook from the South Worcester stream, taking the former by a new channel, to a point below the dam at Quinsigamond. If this were done the Washburn & Moen Co. could raise their dam at Quinsigamond the amount of the fall at South Worcester (about four feet), thus uniting the two privileges, with but little if any damage on account of flowage.

The latter plan is the most favorable, if there is any prospect or probability of adopting the plan proposed by the Hon. Phinehas Ball, for the utilization of the sewage of the city, in his report on that subject, dated January 24th, 1873.

Surveys, plans and estimates have been made to ascertain the best manner of draining Pine Meadow and vicinity. No one who has been in the habit of passing through Shrewsbury or East Central streets, during the past season, can have any doubt of the necessity of a sewer in those streets. The best plan appears to be, to build a 44x66-inch brick sewer from Mill Brook Sewer at Front street, through Front and Shrewsbury streets, to a point near the second culvert easterly from the west side of the Meadow, a distance of 3,180 feet. The fall between the ordinary surface of the water at said culvert and Mill Brook at the place of starting is $8\frac{12}{100}$ feet — by using a grade of one-tenth of a foot to each hundred feet, the bottom of the sewer at the easterly end would be $4\frac{92}{100}$ feet below the ordinary surface of the water, thus draining the meadow more than four feet below its present surface.

To complete the system, this sewer should be extended to the easterly side of the meadow and sewers built in East Central and Pine streets and in some of the streets between them. The area drained by these sewers would be 267 acres.

In 1870 a sewer was built in Pleasant street, from Lincoln Brook to Piedmont street. This sewer was built to take the overflow of the Sever street sewer. The general sewage of the district was not allowed to pass through it, a gate being placed in the sewer in such a manner as to allow only such sewage as is mingled with the storm waters to pass through it, thereby keeping the storm and freshet waters from overflowing the Piedmont street sewer. The only sewer which at that time discharged into the Lincoln Brook was a small sewer in Merrick street, which drained only five estates. Since that time sewers have been built in Russell and South Russell streets, and a number of houses have been built on Bellevue street, the drainage of which finds its way into the Lincoln Brook, making it quite filthy and so much of a nuisance that the citizens living in the vicinity have petitioned for its removal. In answer to their complaints the Brook, between Pleasant and Austin streets, has been twice cleaned out, during the past year, by order of the Committee on Sewers.

The best way to remedy this evil is to extend the sewer now laid in Pleasant street as far as Mason street, thence through Mason street to Tufts street; thence by Tufts street to Beaver Brook, a distance of 2,930 feet. This is the plan recommended by Mr. Ball, in his report of July 22d, 1872, and he therein says, "this sewer when built, would form the main outlet for the entire sewage of the district west of Sever street, and its outlet would be at a point as advantageous for disposing of, or utilizing the sewage in its course, as any position which could be selected."

Some of the streets in the district, bounded easterly by Hammond street, northerly and westerly by Main and Woodland streets, south-westerly and southerly by Richards and Cambridge streets, now need sewers, and it will not be many years before the main outlet for this district will have to be built.

The main sewer in the Grafton street district has been built the past year, and sewers are much needed in Penn Avenue, Barclay and Houghton streets.

The sewer in Endicott street will need to be extended from Ward to Vernon street as soon as the buildings projected are built on said street.

An abstract of the work done upon Streets and Highways is appended to this report, the totals of which are as follows, viz: Length of streets which have been constructed this year, $7\frac{96}{100}$ miles; length of streets of which surveys, plans and decrees of location have been made and prepared, $8\frac{14}{100}$ miles; of streets surveyed and plans made $8\frac{83}{100}$ miles; of side-walks laid out, grades set and decrees of location prepared $10\frac{8}{10}$ miles. The lines, grades and measurements have been given for setting $3\frac{67}{100}$ miles of curbstone.

The sheets for an additional volume of the maps of the city, to contain 43 sheets, have been finished during the year. The sheets are duplicated, the same as the previous volumes. Considerable material has been collected for additional maps.

All of which is respectfully submitted.

W. E. MILLS,

Acting City Engineer.

WORCESTER, Dec. 26th, 1874.

STREETS AND HIGHWAYS CONSTRUCTED IN 1874.

STREETS.	LINEAL FEET.	REMARKS.
Auburn,	784 feet.	From Kendall to Catharine street.
Crescent,	1,106 “	“ Garden street, north.
Canterbury,	4,358 “	“ Hammond street to Cambridge street.
Endicott,	920 “	“ Ward street to Vernon street.
Grafton,	729 “	“ Penn avenue to Mendon street.
Hammond,	1,580 “	“ Southbridge street, north.
Hope Avenue,	4,053 “	“ Webster street to Southbridge street.
Lake Avenue,	12,600 “	“ Belmont street to Harrington street.
Lincoln,	3,800 “	“ Frederick street to Burncoat street.
Newton,	2,539 “	“ Pleasant street to May street.
North Newton,	1,227 “	“ Pleasant street to Elm street.
Pratt st., extension,	4,706 “	“ Salisbury street to Elm street.
Pond,	760 “	“ Green street to Water street.
Suffolk,	1,870 “	“ Bloomingdale road to Grafton street.
Wellington,	1,017 “	“ Main street to Chandler street.
Total,	42,049 feet,	or $7\frac{96}{100}$ miles.

Arch Bridge, Leicester st., over Tatnuck Brook at New Worcester.

STREETS AND HIGHWAYS SURVEYED, PLANS AND DECREES OF LOCATION PREPARED.

STREETS.	LINEAL FEET.	REMARKS.
Belmont,	11,887 feet,	From Lincoln square to Shrewsbury line.
Canterbury,	4,358 “	“ Hammond st. to Cambridge street.
Crescent,	2,535 “	“ Garden street to North street.
Crown,	399 “	“ Chatham street to Austin street.
Canal,	222 “	“ Front street to Cherry street.
College,	3,583 “	“ Southbridge street to Auburn line.
Edgeworth,	1,289 “	“ Milton street to Byron street.
Earle,	324 “	“ Edward street to Elizabeth street.
Grafton,	729 “	“ Penn avenue to Mendon street.
Highland,	2,024 “	“ Elm Park to Pleasant street.
John,	446 “	“ North Ashland st. to West street.
Leicester,	8,969 “	“ New Worcester to Leicester line.
Ledge,	931 “	“ Water street to Providence street.
Lodi,	864 “	“ Lamartine street to Salem street.
Larch,	809 “	“ Merrick street to Winslow street.
Loudon,	470 “	“ Main street to Woodland street.
South Russell,	810 “	“ Pleasant street to Austin street.
Wachusett,	1,139 “	“ Highland street to John street.
Ward,	1,210 “	“ Endicott street to South street.
Total,	42,998 feet,=	$8\frac{14}{100}$ miles.

STREETS SURVEYED AND PLANS MADE.

STREETS.	LINEAL FEET.	REMARKS.
Curtis,	900 feet,	Lake street to Webster square.
Kendall,	990 “	Grade established.
Eastern avenue,	1,500 “	From Shelby to East Central street.
Main,	9,454 “	“ Austin street to New Worcester.
Mill,	900 “	“ Newton street to New Worcester.
Newton,	1,655 “	“ Mill street to Leicester street.
Nixon,	1,750 “	“ Mountain st. to W. Boylston line.
Normal,	550 “	“ Prospect street to Eastern avenue.
Plantation,	2,676 “	“ Belmont st. to Bloomingdale Road.
Pleasant,	3,054 “	“ Newbury street to Newton Hill.
Prospect,	650 “	“ Mulberry st. to Eastern avenue.
Queen,	1,648 “	Levelled for grade.
Stafford,	7,590 “	From Leicester street to Leicester line.
Southbridge,	12,147 “	“ Myrtle street to Auburn line.
Ward,	1,800 “	“ Vernon street to Millbury line.
Total,	46,664 feet,=	$8\frac{83}{100}$ miles.

SIDEWALKS LAID OUT, GRADES SET AND DECREES PREPARED.

STREETS.	LINEAL FEET.	REMARKS.
Auburn,	1,585 feet,	Both sides, from Kendall to Catharine street.
Boynton,	2,878 “	“ “ “ Highland to Salisbury “
Bowdoin,	3,002 “	“ “ “ Harvard to West “
Carroll,	1,014 “	“ “ “ Laurel to Glen “
Cedar,	2,136 “	“ “ “ Oak to Sever “
Davis Park,	324 “	Around the Park (Clinton street).
Glen,	1,590 “	Both sides, from Orchard to Edward “
Hammond,	1,659 “	“ “ “ Main to Beacon “
Hanover,	2,734 “	“ “ “ Arch to Kendall “
Kendall,	918 “	South side, “ Lincoln to Oak avenue.
Liberty,	1,552 “	Both sides, “ Arch to Belmont street.
Lamartine,	3,681 “	“ “ “ Lafayette to Washington “
Ledge,	1,903 “	“ “ “ Water to Providence “
Lafayette,	4,546 “	“ “ “ Southbridge to Millbury “
Lincoln,	3,133 “	“ “ “ Frederick to Cushing “
Linwood,	854 “	“ “ “ Lincoln to Fountain “
Main,	2,057 “	“ “ “ Downing to Beaver “
Mason,	1,306 “	“ “ “ Pleasant to Austin “
Prescott,	3,471 “	“ “ “ Lincoln sq. to Mill Brook “
Pine,	1,850 “	“ “ “ Shrewsbury to Henry “
Penn avenue,	3,567 “	“ “ “ Grafton to Union avenue.
Shrewsbury,	900 “	South side, from Pine to Henry street.
Spring,	355 “	West “ “ Front to Mechanic “
Vernon,	720 “	Both sides, “ Pattison to Richland “
Washington,	2,056 “	“ “ “ Gold to Lamartine “
Water,	3,303 “	“ “ “ Winter to Vernon “
Total,	53,094 feet,	$10\frac{5}{100}$ miles.

ABSTRACT OF SEWERS

Built from December 1st, 1873, to December 1st, 1874.

Built by Sewer Department.

STREETS.	Size in Inches.	Feet of Sewers.	Manholes.	Basins.	Inlets.	Feet of Pipe Inlets	Size of Inlets.	LOCATION, ETC.
Auburn,	12	348.1	2					Old Sewer to Catharine st.
Bowdoin,				1	1	9	12″	At Chestnut st.
Beacon,				2	2	24	12″	Near Hammond st.
Carroll,				1	1	9	12″	At Shelby st.
Denny,	15 oval	444.4	5					Dix to Highland st.
Dix,				1	1	27	12″	At Wachusett st.
Endicott,	24x36	608.0	5	4	4	36	12″	Millbury to Ward street.
Foundry,				1	1	10	12″	At Canal street.
Fruit,				2	2	24	12″	" Pleasant and Elm streets.
Front,				1	1	48	12″	At Washington sq.
Hawley,	15 oval	535.2	6					Austin st., north.
Hanover,				2	2	15	12″	At Kendall street.
Highland,	20x30	448.35	3	3	3	48	12″	Old sewer (west) and at Pink st.
Hermon,				1	1	21	12″	At Beacon st.
Hammond,				2	2	18	12″	" " "
Harrison,				2	2	15	12″	" Blake street.
Laurel,	24 oval	253.2	1	4	4	36	12″	Hanover to Carroll street.
"	18 oval	1,067.8	7	2	2	18	12″	Carroll to Eastern avenue.
Lincoln,	20x30	218.5	2	3	3	33	12″	Kendall st. (north) and at Linw'd pl.
Linwood,				2	2	6	12″	At Lincoln street.
Millbury,				1	1	24	12″	Opp. Seymore st.
May,				2	2	27	12″	Near Kingsbury st.
Main,				3	3	60		At Sycamore and Wellington sts., and City Hall.
North Ashland,				5	5	75	12″	At John, Bowdoin, Lily, Home, and Highland sts.
Orange,	12	290.6	3					Plymouth to Lynn street.
Plymouth,	18 oval	4.98	1					Old sewer to Orange street.
Orchard st. ct.,				1	1	3	12″	At end of Court.

STREETS.	Size in inches.	Feet of Sewer.	Manholes.	Basins.	Inlets.	Feet of Pipe Inlets	Size of Inlets.	LOCATION, ETC.
Park,				1	1	1	12″	Near Portland st.
Portland,				1	1	12	12″	At Park street.
Piedmont,				1	1	12	12″	At Prince street.
Queen,	12	252.8	2					" Davis st., south.
Summer,				1	1	12	12″	" Fulton " "
Sever,				1	1	15	12″	" Elm " "
School,				1	1	3	12″	" Union " "
Union,				1	1	12	12″	Near Foster, "
West,				2	2	21	12″	At Cedar and Bowdoin streets.
Wilmot,				2	2	18	12″	At Laurel street.
Ward,	15 oval	30.7	1	2	2	33	12″	" Endicott "
Washington,				1	1	12	12″	" Lamartine st.
Wellington,				2	2	18	12″	Rebuilt.
Total,		4,547.4	38	62	62	755		2 basins discont'd.

BUILT BY M. R. EDWARDS.

STREETS.	Size in Inches.	Feet of Sewer.	Manholes.	Basins.	Inlets.	Feet of Pipe Inlets	Size of Inlets.	LOCATION, ETC.
Cutler,	22″x33″	885.4	8	2	2	22.5	12″	Grafton to Ætna street.
"	20″x30″	327.0	3	2	2	20.5	12″	Ætna to end of street.
Coral,	16″x24″	859.4	7	6	6	74.0	12″	Grafton to Clarkson st.
"	18″ oval	736.0	5	2	2	22.5	12″	Clarkson to Ætna street.
Grafton,	30″x45″	1654.1	10	2	2	25.5	12″	Winter to Mendon st.
"	24″x36″	727.0	5	4	4	48.0	12″	Mendon to Houghton st.
Hamilton,	24″x36″	463.0	4	1	3	27.0 10.0	15″ 12″	Grafton street East.
Mendon,	16″x24″	1102.0	9	6	6	73.5	12″	Grafton to Ætna street.
"	18″ oval	112.5	1					South of 16″x24″.
Totals,		6865.5	52	25	27	27 296.5	15″ 12″	

SUMMARY OF SEWERS.

Built from December 1, 1873, to December 1, 1874.

BY WHOM BUILT.	LENGTH OF SEWERS.	Manholes.	Basins.	Inlets.	Pipe in Inlets.
M. R. Edwards,	6865.5	52	25	27	323.5
Sewer Department,	4547.4	38	62	62	755.0
Totals,	11,412.9	90	87	89	1078.5

2 Basins and 4 Inlets discontinued.

Summary of Sewers now Laid in the City of Worcester.

DATE.	FEET OF SEWERS LAID.	MANHOLES.	BASINS.	INLETS.
Up to 1867,	6,481.5	14	17	93
1867,	5,539.5	19	2	4
1868,	15,869.0	108	71	102
1869,	24,720.0	199	51	61
1870,	43,320.0	334	146	161
1871,	33,158.9	292	163	173
1872,	17,887.5	162	51	52
1873,	14,893.4	127	90	82
1874,	11,412.9	90	85	85
Totals,	173,282.7	1345	676	759
$32\frac{4323}{5280}$, or 32.82 Miles of Sewer.				

INVENTORY OF THE PROPERTY OF THE SEWER DEPARTMENT, JAN. 1, 1874.

One pump,	valued at	$25 00
One boat, in Mill Brook sewer,	" "	20 00
Two tool chests,	" "	16 00
One tool chest, small,	" "	1 00
One pair hip boots,	" "	3 00
Two wheelbarrows,	" "	6 00
Eleven lanterns,	" "	8 00
Nineteen picks,	" "	19 00
Twenty shovels,	" "	15 00
Two hoes,	" "	1 50
Five crow-bars,	" "	10 00
Eight pails,	" "	3 00
One lot sewer scrapers,	" "	12 00
One lot of gas pipe,	" "	7 00
One handsaw and one hatchet,	" "	1 25
One axe, one tape line and two trowels,	" "	3 25
One lot stone hammers,	" "	15 00
Two large iron buckets,	" "	8 00
One hydrant wrench and coal shovel,	" "	1 75
One lot of hose for flushing,	" "	15 00
One lot of timber,	" "	15 00
One lot tackle blocks and rope,	" "	12 00
One lot rope,	" "	15 00
One hundred feet ⅝ rubber hose,	" "	12 00
One express wagon,	" "	150 00
One lot striking hammers and drills,	" "	35 00
One thousand brick,	" "	10 00
One hundred feet flagging stone,	" "	22 00
One lot bracing plank,	" "	15 00
Four long-handled shovels,	" "	3 00
One lot stone tools,	" "	3 00
Two spirit levels,	" "	3 00
One powder and one oil can,	" "	50
One tamping bar,	" "	75
One lot of cement pipe,	" "	30 00
Two sets shears for tackle blocks,	" "	5 00
One mattock and one square,	" "	1 75
Two puddling bars,	" "	1 50
Seven fish-hook ropes,	" "	3 50
One ladder,	" "	1 50
Two barrels cement,	" "	3 80
		$534 05

ERRATA.

[NOTE.—In the process of copying the Abstract of Sewers a street was accidentally omitted, which was not discovered until after the sheets were printed, rendering the following corrections necessary.]

ABSTRACT OF SEWERS.

BUILT FROM DEC. 1, 1873, to DEC. 1, 1874, BY SEWER DEPARTMENT.

STREET.	Size in Inches.	Feet of Sewer.	Manholes.	Basins.	Inlets.	Feet of Pipe Inlets.	Size of Inlets.	LOCATION, ETC.
		4547.4	38	62	62	755.0		
Jefferson,	15″ oval.	837.1	6					Vernon to Arlington st.
"	12″	97.5	1					Arlington to Providence st.
Totals, ...		5482.0	45	62	62	755.0		

SUMMARY OF SEWERS.

BUILT FROM DECEMBER 1, 1873, TO DECEMBER 1, 1874.

BY WHOM BUILT.	LENGTH OF SEWERS.	Manholes.	Basins.	Inlets.	Pipe in Inlets.
M. R. Edwards,	6,865.5	52	25	27	323.5
Sewer Department,	5,482.0	45	62	62	755.0
Totals,	12,347.5	97	87	89	1078.5

2 Basins and 4 Inlets discontinued.

SUMMARY OF SEWERS NOW LAID IN THE CITY OF WORCESTER.

DATE.	FEET OF SEWERS LAID.	MANHOLES.	BASINS.	INLETS.
Up to 1867,	6,481.5	14	17	39
1867,	5,539.5	19	2	4
1868,	15,869.0	108	71	102
1869,	24,720.0	199	51	61
1870,	43,320.0	334	146	161
1871,	33,158.9	292	163	173
1872,	17,887.5	162	51	52
1873,	14,893.4	127	90	82
1874,	12,347.5	97	85	85
Totals,	174,217.3	1352	676	759
33 Miles of Sewer (nearly).				

ANNUAL REPORTS

OF THE

COMMITTEE ON WATER,

THE

CITY ENGINEER,

THE

WATER REGISTRAR,

AND THE

WATER COMMISSIONER,

OF THE

CITY OF WORCESTER,

FOR THE YEAR ENDING NOVEMBER 30, 1875.

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TILDEN FOUNDATIONS.

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WORCESTER:
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ANNUAL REPORT

OF THE

COMMITTEE ON WATER.

To the Council of the City of Worcester :—

In compliance with an ordinance of the City, the Joint Standing Committee on Water submit their report with those of the Water Commissioner, the Water Registrar, and the City Engineer. For all details we refer to these reports. Within the year there has been laid 7300 feet of pipe, a part of which taking the place of smaller pipe. In addition to which about 9000 feet of service pipe was laid. The largest work was that of a 16 inch pipe in Main Street from Front to Lincoln Square, and in Thomas Street from Main to Union Street. This was done in accordance with a recommendation of the Committee of last year, concurred in by the present Committee, and ordered by the present Council.

The laying of a new main from Lincoln Square through Prescott Street to the works of the Ames Plow Co., also through Grafton Street from Washington Square to Providence Street, was recommended by the Committee of last year, but has not been ordered. We renew the recommendation that it be done the ensuing year.

With a revival of business in the City, many other changes and extensions will be called for, and should be met as the exigency arises.

WATER SUPPLY.

No steps beyond that of investigation have been taken toward a further supply. For a greater part of the year, rains have been so plentiful that the danger of an exhausted supply has not been imminent. But the fact that with more than a usual rainfall our only reservoir has not been filled for more than fifteen months, should excite apprehension, and should be kept prominently before the Council. The measurement of the flow from Henshaw Pond, caused to be made through the year, does not indicate much value from that source unless it should be as a storing reservoir.

North Pond has not, as a source of supply, met with that favor in committee that it had for two years previous. Tatnuck Brook as far as quantity, quality and capacity for storage is concerned, stands pre-eminent, but the expense, that we could not place below $400,000, would in these times, compel great delay, if not a virtual abandonment. Another source of supply would be the storing of the storm waters, or the floods of Kettle Brook. There would be grave legal objections to this course, certainly, without legislative authority, expressly defined. But the expense of making the connection with our present reservoir would be so small that it might be wise to procure that authority, and make such connection.

Above the expense of the connection, it would involve the expense of additional storage either by raising the present dam, or building a new one above the present one to hold the Lynde Brook flow. In the opinion of the Committee, the latter course would be better, safer, and not necessarily more expensive.

We recommend that the Mayor be directed to petition the coming Legislature, for authority to take and store the waste waters of Kettle Brook. It has been stated in reports to the Council from time to time, that a small stream called Parsons Brook, could be turned into the Hunt reservoir at a very small outlay for construction or damage to estates. We recommend that the petition of the Mayor cover authority to take this stream for the uses of the City.

METERS.

Your attention is called to the report of the Registrar on this subject. A limited number of the new "Desper" meter and the "Gem" have been read the past year. The result has been so favorable compared with the Ball & Fitts meter that it may be thought best to make no discrimination between them hereafter. The Committee are unanimously of the opinion that *some* meter should be required, wherever the consumption is large, or where waste is tolerated.

The Registrar and Engineer in their reports have indicated the importance of the self-closing fixtures, applied to faucets, closets, etc. The Committee are impressed with the great importance of these fixtures and recommend such a change of the "Ordinance relative to Water" as shall allow an abatement where they shall be applied. Another necessary change in the Ordinance is one that shall hold all plumbers doing work in connection with the water pipes to a more direct accountability to the Water Department for the character of their work. With these changes, a revision of rates might very properly be considered.

The Commissioner and Registrar, have given their undivided attention to their several duties, and the Committee make this acknowledgment of their unvarying courtesy. The Registrar has largely reduced the expenses of his department, and with the increased business of the office a corresponding increase of salary would still leave it below that of other positions of no greater work or responsibility.

Respectfully submitted,

D. S. GODDARD,
GEORGE GEER,
G. J. RUGG,
T. J. HASTINGS,
Joint Standing Committee on Water.

December 20, 1875.

REPORT OF CITY ENGINEER

TO THE

COMMITTEE ON WATER.

To the Joint Standing Committee on Water:

GENTLEMEN:—In accordance with the provisions of Sect. 11, Chapter 68 of the Ordinances of the City, I respectfully present the following *Report.*

The dam of the Lynde Brook Reservoir has been carefully examined at frequent intervals during the year. The increased leakage in the vicinity of the "pipe arch," as indicated by the weir, induced me to address the following communication to your committee, under date of September 7th.

To the Joint Standing Committee on Water:

GENTLEMEN:—In accordance with the provisions of Sect. 11, Chap. 68 of the Ordinances of the City of Worcester, I deem it my duty to call your attention to the increased leakage through the Lynde Brook Reservoir embankment in the vicinity of the "pipe arch." In April, with the water six feet below the rollway, the leakage was at the rate of 24,221 gallons in twenty-four hours. In July, under a similar head, it had increased to 39,810 gallons per day, and it still continues at that rate, except when affected by surface water after storms. I would recommend that the pipe arch be thoroughly cleaned of all deposit, which will enable careful inspection to determine if the water is discolored on entering the archway, which would indicate an increase of wash under the foundation.

Respectfully submitted,

C. H. M. BLAKE,

Civil Engineer

The cleaning of deposit from the archway was ordered by your Committee, in accordance with the recommendation contained in the above communication. The only means of determining the amount of leakage had been, to this time, by means of the flow over the weir below the outlet of the waste culvert. This, while answering the purpose very well during dry weather, was defective and unreliable at times from the effect of surface water. In order to obviate this difficulty, a weir has been set in the pipe arch itself, where no water not actually entering the arch through a leak can be measured.

The leakage at present is 48,448 gallons per day, showing an increase of about 24,000 gallons since April 1st. It being important to locate the leakage, two weirs were set in the arch, one a short distance from the upper end, and the other near the lower end. It is a matter of congratulation that the investigations prove the leakage is confined entirely within a short distance of the upper end.

The question of an additional supply of water for the city has received considerable attention during the year. By order of the City Council, approved April 6th, thorough surveys were made of Tatnuck Brook, comprising the determination of the extent of its water-shed, capacity of a storage reservoir, and location of dam. Measurements of the flow from Henshaw Pond, and survey of a pipe line from both sources were also made, and June 21st, a Report giving the result of the surveys, estimated cost of construction, and such other suggestions as the object of the order seemed to render necessary for the proper consideration of this important subject was submitted to the City Council. I am convinced that the city cannot with safety defer action on this question. We may, if the seasons are favorable, feel no need of an increase in our supply for several years, and perhaps get through one dry season without serious inconvenience, but long continued meteorological observations prove that *cycles* of dry years are as certain to recur at intervals as the precession of the equinoxes is to continue, and no water supply is reliable which is not capable of providing for these seasons of long continued dry weather. To illustrate the variation of rainfall for terms of years I would refer to table III. in the report mentioned.

The question of economy in the use of water has so often been brought to your notice that, perhaps nothing new can be adduced. There is no doubt that if self-acting hopper-closets were generally introduced, a large saving in domestic consumption would ensue, as the ordinary hopper closet has been proved by actual observation in other cities to be one of the most prevalent sources of waste. As the manufacturing interests of the city are further developed, necessity will arise for the additional supply of large amounts of water for industrial purposes, and it is not to be expected that any system of economy in its use, however rigidly enforced, will decrease the use of water sufficiently to counterbalance the legitimate demand of additional takers.

The daily condition of the supply in the Lynde Brook Reservoir for the year ending December 1st, 1875, is given in the accompanying table, and the Report made to the City Council June 21st, is appended.

I am indebted to the Water Commissioner, Mr. Hall, and the Registrar, Mr. Brown, for information in regard to the Water Department, which has always been cheerfully given on application.

Thanking the Committee for the uniform courtesy received from them while prosecuting work under their direction, this report is most respectfully submitted.

C. H. M. BLAKE,

Civil Engineer.

WORCESTER, Dec. 1st, 1875.

REPORT

OF THE

WATER REGISTRAR.

WORCESTER, Dec. 20, 1875.

To the Joint Standing Committee on Water :—

GENTLEMEN,—In conformity to Section 8 of the "Ordinances relative to Water," I present the following Report for the year ending November 30th, 1875.

During the year, two hundred and four (204) applications for water were received, of which number all but four were granted and the service pipes laid.

I rendered to the City Treasurer for collection the following water bills :—

By Meter,	**2,578**	**amounting to**	**$41,500 14**
" Assessment,	**7,229**	**" "**	**60,212 89**
Total,	**9,807**	**" "**	**$101,713 03**

The water was shut off from the premises of one hundred and twenty-nine (129) takers, on account of unpaid over-due bills for water and labor furnished, and immediately let on upon the payment of bills.

Abatements amounting to $12,018.51 were made, owing to parties ordering meters, on account of tenements which were vacant three months or more, and for correction of assessments.

The quantity of metered water sold is as follows :—

From October, 1874, to April, 1875,	**66,515,086 gallons.**
" April, 1875, to October, 1875,	**134,508,109 "**

Meters.

During the year, three hundred and seventy-nine (379) meters were placed on the works, making at the present time in use fourteen hundred and eighty-six (1,486), the sizes and kinds of which are as follows:—

	⅝ in.	¾ in.	1 in.	2 in.	3 in.	4 in.
Union Water Meter,	242	33	4	3	—	—
Desper, " "	75	5	1	—	—	—
Gem, " "	15	—	—	1	1	2

The "*Union*" Meter has been in use a number of years and gives good satisfaction, and is deemed as reliable as any in the market. The *new* "*Desper*" Meter, patented November 18th, 1873, is a decided improvement on the *old* meter. The former being adopted by the Committee, with certain provisos, for one year, is not entitled to the criticism which a longer term of operation would bestow, but the experience thus far is satisfactory. The "*Gem*" meter, unlike the others in construction, is the least costly, but as to durability a further test is necessary to decide.

It is universally conceded that no meter is perfectly accurate, and the discrepancy is always in favor of the consumer, which fact proves that the register does no injustice to parties who pay for water by meter rates.

The Waste of Water.

I deem the system of measuring water to *all* consumers to be the most equitable, as it is an undeniable fact that some families waste much more than others use, and yet, under the present arrangement, pay the same rate. Unnecessary consumption of water is certainly checked by the tell-tale meter, and the city receives pay for water which is indifferently used. Cases often occur where a party having water by meter rates is surprised at the amount of his bill, and positive that his use of water would incur a much less sum. When informed that his hose pipe, left open on the lawn, is wasting four thousand gallons per day; that a faucet, allowed to run a broken stream, is adding two hundred gallons daily to his meter register; that the float in his water tank is arranged so as to permit thousands of gallons of water to run into the sewer weekly, the party immediately takes measures to check the disorder, which but for the meter might continue to exist. Enormous wastes of water have been detected through the presence of meters. During the past year, several large leaks have occurred in covered service-pipes, and had not the unusual amount of water registered indicated something wrong, the waste would have continued an indefinite period.

I desire to offer a word in commendation of Desper's self-closing fixtures, which can be attached at a small expense to faucets, closets, etc. The advantage to consumers of measured water is obvious, as the liability to leave water running is prevented. Several instances of its efficacy which have come to the knowledge of the department prompts this notice.

Cheap fixtures in buildings, constantly needing repairs—water closets and sinks used in common by several families—water allowed to run in Winter to prevent freezing—hose pipes used to an extent little dreamed of by those who fixed the rates for same; these, with other causes, serve to swell the torrent of waste water running annually, and for which the city derives no revenue. I might expatiate on the subject, but deem the following, which I quote from the report of the Chicago Water Department, as pertinent in conclusion:—

> "The monstrous waste of water which takes place annually in the extreme weather of Summer and Winter, is a reflection upon the moral sense of those who are guilty of it. It appears to be impossible for many people to understand that water, unlike air, is not a free commodity, and that no one is entitled to use more water than he pays for. The water of the city is municipal property, sold to individuals in precisely the same commercial way in which citizens purchase food or clothing; and it is no more a privilege to waste water than to steal the groceries of the merchant or the fabrics of the dry goods dealer."

I consider the matter of plumbing work being done under a license as highly important. Many cities have very strict rules and enforce them, which bear on this subject. Much cheap and poorly done work is performed by parties whose knowledge of plumbing is so limited that their ignorance is palpable, the result of which is a detriment to the owners of property and an expense to the city.

Owing to the general depression in business, many tenements have been idle, thereby causing a large number of abatements on bills. For the same reason, numerous over-due accounts remain unpaid. The Registrar admits that he has been somewhat dilatory in enforcing Section 9 of Rules and Regulations, but the pressure caused by the existing state of financial affairs induced him, after consultation with the City Treasurer, to show as much leniency as possible to those whose desire to settle bills was as apparent as their inability so to do.

The triple subject of Consumption, Supply and Waste, has always furnished ample avenues of thought and discussion. You have certainly had the burden of opinion to bear the last year, and, I am confident, will not object to the investigation of the theme by any future Committee who have the interest of the city at heart.

Respectfully submitted,

J. STEWART BROWN,

Registrar.

REPORT

OF THE

WATER COMMISSIONER.

To the Joint Standing Committee on Water :—

THE Commissioner presents his Annual Report for the year ending November 30, 1875.

Main pipes have been laid in all streets where ordered by the City Council, as follows :—

8	inch pipe in	Lincoln street, from Forest avenue north,	480 feet.
8	" " "	Bloomingdale road, from Suffolk street west,	670 "
6	" " "	Pitt st., from Cambridge st. to Riverside Mill,	621 "
6	" " "	King street, from Chandler to Woodland st.,	723 "
6	" " "	Sigourney st., from North to Edgeworth st.,	435 "
6	" " "	Suffolk street, from Bloomingdale road,	45 "
6	" " "	Reservoir street, from Elizabeth st. east,	158 "
6	" " "	Laurel street, from Carroll street east,	129 "
6	" " "	Temple street under Mill Brook,	60 "
4	" " "	Temple street to Mill Brook,	50 "
4	" " "	Mount Pleasant st. from Benefit to Allen st.,	350 "
4	" " "	Hermon street east of Junction Shop, to connect to Jackson street,	120 "
		Amount of new pipe laid this year,	3,841 "

Connection has been made between the high service and the 12 inch pipe to the Hunt Reservoir, to be used in case of repairs upon the old line from the Leicester Reservoir.

The 4 and 6 inch pipe on Main street, from Front street to Lincoln Square, has been taken up and replaced by 16 inch pipe a distance of 2,896 feet. 16 inch pipe has been laid in Thomas street, from Main to Union street, a distance of 638 feet.

Owing to change of grade in Suffolk street, 525 feet of 6 inch pipe had to be taken up and relaid; also 342 feet of 4 inch pipe in May street, for the same reason. In Gardner street, 310 feet of 6 inch pipe has been relaid, between Canterbury and Southgate streets. Amount of pipe relaid, 4,711 feet.

Number of gates set, 45; hydrants, 28; hydrant branches, 18; street branches, 34; meters, 379; service pipes laid, 214 or 4,087 feet 7 inches for the city, and 5,089 feet 3 inches for applicants.

The extreme cold weather of the last Winter continuing until near Spring, caused serious trouble with water pipes and hydrants, not only here but throughout the country, causing great inconvenience and annoyance to water takers, and a large expense to the city, making this as busy a time as any season of the year. 750 service pipes were reported frozen, which were thawed by the Department, the last one being thawed April 30. Many were thawed by plumbers, so it is impossible to tell the number of pipes frozen.

Main pipe was frozen in	Belmont street,		12	inch	pipe.
" " " "	Bismarck street,	200 feet,	2	"	"
" " " "	Blossom street,	600 "	4	"	"
" " " "	E. Central street,		4	"	"
" " " "	Goddard street,		2	"	"
" " " "	Gold street,		4	"	"
" " " "	Grosvenor street,	100 feet,	4	"	"
" " " "	Hudson street,	500 "	4	"	"
" " " "	Lodi street,	100 "	4	"	"
" " " "	Market street,	400 "	4	"	"
" " " "	Park street,	200 "	4	"	"
" " " "	Pleasant street,	300 "	8	"	"
" " " "	Siegel street,	500 "	4	"	"
" " " "	Summer street,	300 "	4	"	"

Great credit is due to Chief Engineer Combs and the officers of the Fire Department for the assistance rendered in caring for hydrants, thereby relieving, in a measure, the demands upon this Department.

Various devices have been brought before the public as "non-freezing" and "anti-freezing," which have been recommended for the use of water works; but the plan deemed the most effectual is the laying of all pipe at a depth to be below the reach of the frost.

Acting upon this idea, many of the service pipes have been lowered, and all that are now laid are put six and one-half feet below the surface.

Longer hydrants have been substituted for several of the short ones formerly in use, and by another season all of them will be removed.

The number of leaks repaired, 284. On main pipe: Joints, 106; rust, 38; frost, 17; split, 7; pick-hole, 3; bowl joint, 5; hydrant valve, 4; packing, 1; bonnet blew off, 1; ¼ turn blew off, 1. On service pipe: Frost, 81; lead connection, 10; settling of earth, 2; union joint, 2; split, 6. Stoppages in service pipe reported, 81.

Location of hydrants set during the year:—

Austin street, opposite Queen street.
" " corner Bellevue street.
Bellevue street, between Austin and Pleasant streets.
Bloomingdale road, west of Graton & Knight's shop.
Carroll street, opposite Shelby street.
Highland street, opposite Goulding street.
" " corner Boynton street.
Jefferson street, corner Arlington street.
King street, west of Shepard street.
Lafayette street, corner Lodi street.
" " " Grosvenor street.
Main street, opposite Piedmont street.
" " corner Allen street.
" " " Kilby street.
Mason " " Austin street.
May " " Kingsbury street.
Milton " " Edgeworth street.
Mount Pleasant street, opposite Allen street.
Norfolk street, corner Hawkins street.
" " " Ascension street.
Ripley street, south of J. H. Walker's.
Shelby street, opposite Mulberry street.
Sigourney street, corner Edgeworth street.

Southgate street, south side of Norwich & Worcester Railroad.
" " front of D. S. Goddard's shop.
Temple street, west of Church.
Wall street, corner Norfolk street.
Wachusett street, between Dix and Highland streets.

Accompanying this Report is an Inventory of Stock of Tools on hand November 30, the appraised value of which is $37,190.65.

Respectfully submitted,

FRANK E. HALL,

Water Commissioner.

WORCESTER, Dec. 20, 1875.

INVENTORY OF STOCK AND TOOLS ON HAND DECEMBER 1, 1875.

10	pieces 20 inch cast iron pipe,
63	pieces 16 inch cast iron pipe,
152	pieces 12 inch cast iron pipe,
23	pieces 8 inch cast iron pipe, class B,
117	pieces 8 inch cast iron pipe, class A,
46	pieces 6 inch cast iron pipe,
189	pieces 6 inch cast iron pipe, been used,
128	pieces 5 inch cast iron pipe, been used,
12	feet 24 inch cast iron pipe,
16	feet 20 inch cast iron pipe,
131	feet 16 inch cast iron pipe,
40	feet 12 inch cast iron pipe,
30	feet 8 inch cast iron pipe,
50	feet 6 inch cast iron pipe,
275	feet 6 inch cast iron pipe, been used,
220	feet 4 inch cast iron pipe, been used,
1,810	feet 15 inch unlined pipe,
210	feet 12 inch cement lined pipe,
1,596	feet 10 inch cement lined pipe,
1,638	feet 8 inch cement lined pipe,
70	feet 6 inch cement lined pipe,
448	feet 3 inch cement lined pipe,
504	feet 2 inch cement lined pipe,
72	feet 20 inch cement lined pipe, been used,
137	feet 16 inch cement lined pipe, been used,
107	feet 12 inch cement lined pipe, been used,
273	feet 10 inch cement lined pipe, been used,
98	feet 6 inch cement lined pipe, been used,
2,226	feet 4 inch cement lined pipe, been used,
664	feet 2 inch galvanized iron pipe,
2	20 inch curve pieces,
6	16 inch curve pieces,
10	8 inch one-eighth turns,
2	6 inch one-eighth turns,
8	4 inch one-eighth turns,
4	16 inch quarter turns,
4	12 inch quarter turns,
6	8 inch quarter turns,
10	6 inch quarter turns,
8	4 inch quarter turns,
1	2 inch quarter turn, brass,
3	16x16 three way branches,
2	16x12 three way branches,
2	16x8 three way branches,
8	16x6 three way branches,
12	16x4 three way branches,
4	12x8 three way branches,
8	12x6 three way branches,
2	12x4 three way branches,
1	10x6 three way branches,
2	10x4 three way branches,
12	8x8 three way branches,
38	8x6 three way branches,
10	8x4 three way branches,
26	6x6 three way branches,
27	6x4 three way branches,
11	5x4 three way branches,
33	4x4 three way branches,
1	16x16 four way branches,
4	16x12 four way branches,
3	12x8 four way branches,
3	12x6 four way branches,
2	8x8 four way branches,
2	8x6 four way branches,
11	6x6 four way branches,
1	4x4 four way branches,
14½	set sleeves for 16 inch cement lined pipe,
28	set sleeves for 12 inch cement lined pipe,
21	set sleeves for 10 inch cement lined pipe,
7½	set sleeves for 8 inch cement lined pipe,
26½	set sleeves for 6 inch cement lined pipe,
6½	set sleeves for 4 inch cement lined pipe,
7½	set sleeves for 3 inch cement lined pipe,
40	set sleeves for 2 inch cement lined pipe,
14	sleeves for 24 inch cast iron pipe,
2	sleeves for 20 inch cast iron pipe,
7	sleeves for 16 inch cast iron pipe,
3	sleeves for 12 inch cast iron pipe,
35	sleeves for 8 inch cast iron pipe,
20	sleeves for 6 inch cast iron pipe,
8	sleeves for 5 inch cast iron pipe,
17	sleeves for 4 inch cast iron pipe,
3	sleeves for 3 inch cast iron pipe,
8	set ½ sleeves for 12 inch pipe, with bolts,
8	set ½ sleeves for 8 inch pipe, with bolts,
1	20x16 inch taper,
9	12x8 inch tapers,
1	12x6 inch taper,
12	8x6 inch tapers,
16	6x4 inch tapers,
5	4x3 inch tapers,
4	4x2 inch tapers,
2	24 inch bonnets,
1	16 inch bonnet,
2	12 inch bonnets,
16	8 inch bonnets,
22	6 inch bonnets,
39	4 inch bonnets,

1 20 inch plug,
1 16 inch plug,
11 12 inch plugs,
4 8 inch plugs,
6 6 inch plugs,
1 16 inch gate, Ayres,
4 12 inch gates,
1 10 inch gate,
18 8 inch gates,
12 6 inch gates,
21 4 inch gates,
18 gate boxes,
12 gate box frames,
20 gate box covers,
4 gate box frames and covers, small,
3 flush hydrants,
1 Philadelphia hydrant,
11 flush hydrant box frames and covers,
27 hydrant wastes,
7 hydrant bowls,
2 pieces cast iron pipe for hydrant bowls,
8 set bands and bolts for flush hydrants,
318 lbs. cast iron bands for repairing solder branches,
1,042 lbs. wrought iron bands and bolts for street branches,
40 feet 3 inch steam pipe,
300 feet 1¼ inch steam pipe,
375 feet 1 inch rubber coated pipe,
975 feet 1 inch cement lined pipe,
697 feet ¾ inch cement lined pipe,
761 feet 1 inch unlined pipe,
385 lbs. 2 inch lead pipe,
300 lbs. 1 inch lead pipe,
50 lbs. ⅝ inch lead pipe,
1,190 lbs. ½ inch lead pipe, been used,
25 lbs. solder,
26 1 inch lead connections,
7 ⅝ inch lead connections,
67 ½ inch lead connections,
2 3 inch globe valves,
11 1 inch Ludlow gates,
6 ¾ inch Ludlow gates,
37 ½ inch stops for bands,
82 ½ inch stops for bands, been used,
3 ¾ inch waste stops,
34 ½ inch waste stops,
8 2 inch long brass nipples,
15 2 inch short brass nipples,
63 cast iron stop boxes,
330 cast iron stop box covers,
6,220 lbs. tapping bands,
96 lbs. wrought iron bands,
608 lbs. bolts and nuts for service pipe,
133 lbs. bolts for 24 inch sleeves,
65 1¼ inch brass tees,
259 1 inch brass tees,
25 1x¾ inch rubber coated tees,
20 2 inch plugs,
56 1¼ inch plugs,
80 1 inch plugs,
209 ¾ inch plugs,
10 1 inch combination nipples,
38 ⅝ inch combination nipples,
18 ¾ inch thimble couplings,
22 ½ inch thimble couplings,
15 1x¾ inch galvanized iron reducing coupling,
10 2 inch malleable iron unions,
1 1½ inch malleable iron unions,
12 1 inch malleable iron unions,
1 2 inch rubber coated elbow,
2 1 inch rubber coated elbows,
25 1x¾ inch galvanized iron elbows,
18 2 inch rubber packings for tapping bands,
54 1 inch rubber packings tor tapping bands,
148 ½ inch rubber packings for tapping bands,
2 4 inch meters,
1 2 inch Gem meter,
6 1 inch meters,
6 ¾ inch meters,
1 1 inch Worthington meter,
1 ⅝ inch meter,
2 meter box frames and covers
3 bbls. Portland cement,
16 bbls. cement,
1 Knowles' rotary pump,
1 Knowles' large steam pump,
1 Knowles' small steam pump,
5 force pumps,
2 copper pumps,
3 tool boxes and 4 chests,
9 wheelbarrows,
46 picks,
12 pick handles,
48 shovels,
11 iron bars,
16 iron tampers,
14 striking hammers,
5 stone hammers,
12 hand hammers,
2 paving hammers,
31 hammer handles,
271 lbs. steel in drills,
25 hand drills,
10 iron spoons,
4 ladles,
1 small ladle,
56 cold chisels,
28 steel sets,
5 packing irons,
1 large furnace and ladle,
4 furnaces,
15 monkey wrenches,
12 Baxter wrenches,
4 pair 1½ inch pipe tongs,
6 pair 1¼ inch pipe tongs,
5 pair 1 inch pipe tongs,

6 pair ¾ inch pipe tongs,
4 pair ½ inch pipe tongs,
1 pair ⅜ inch pipe tongs,
2 pair ¼ inch pipe tongs,
4 pair ⅛ inch pipe tongs,
9 hand axes,
1 adze,
4 hand saws,
2 bit stocks and bits,
1 saw set,
2 try squares,
2 planes,
1 drawing knife,
2 grind-stones,
1 oil stone,
3 screw drivers,
1 hoe,
1 spirit level,
5 oilers,
2 powder cans,
10 trowels,
3 soldering furnaces and tools,
17 files,
3 pair plyers,
2 paving rammers,
1 ratchet and drills,
3 pair tongs for lifting pipe,
5 hay knives,
1 hay fork,
14 long handled forks,
2 scythes and snaths,
3 spoons for cleaning stop boxes,
6 hooks for removing hydrant wastes,
3 forks for removing hay from hydrants,
5 Stanwood's pipe cutters,
1 Chase patent pipe cutter and dies,
1 2 inch tap,
1 1¼ inch tap,
1 1 inch tap,
1 ¾ inch tap,
1 ½ inch tap,
1 packing box tap,
7 die plates and 23 dies,
6 packed drill stocks and 20 drills,
1 drill stock and drill for drilling iron pipe,
14 stop wrenches,
11 gate wrenches,
10 hydrant wrenches,
3 wrenches for repairing hydrants,
Lot of tools for building hydrants,
1 platform scale,
9 sets cones for lining pipe,
9 sets cones for lining service pipe,
9 rubber cones,
3 wagons,
1 Concord buggy,
1 sleigh,
1 harness,
2 hand carts,
3 derricks,
3 sets pulley blocks and ropes,
8 dies for cutting packing.

MISCELLANEOUS.

34 water pails,
3 galvanized iron boilers,
1 copper boiler,
2 boilers for thawing hydrants,
1 tank for testing meters,
1 truck,
1 hand sled,
5 mixing boxes,
15 pair rubber boots,
5 brooms,
1 coal hod,
31 lanterns,
42 lantern globes,
35 glasses for lamps,
5,000 feet chestnut lumber,
1,022 lbs. wrought iron rods,
170 lbs. old brass,
2,100 lbs. pig lead,
800 lbs. old lead,
10 lbs. white lead,
458 lbs. chains,
274 lbs. rosin,
27 pickets for reservoir fence,
12 pair rubber mittens,
2 pair long rubber mittens,
2 cast iron sinks,
4 stoves,
1 goose neck,
262 feet rubber hose,
9 tea kettles,
1 anvil,
1 portable forge,
2 fan blowers,
3 iron vises,
2 wood vises,
3 pair shears,
1 cast iron frame for screen,
1 mud boat,
1 drinking fountain,
1 stand pipe for filling watering cart,
3 tons of coal,
1 handle basket,
4 carpenters' horses,
1 steam gauge,
1 oil tank,
9 oil cans,
10 gallons kerosene,
11 brass screws for gates,
11 nozzles for hydrants,
24 hydrant caps,
4 brass tops for hydrants,
150 lbs. post hydrant box hoops,
180 lbs. post hydrant box fastenings,
2 brass screws for hydrants,

14 jack screws,
2 desks,
5 office chairs,
4 window frames,
3 platforms for holding pipe
3 oil cloth suits,
1 canvas tent and frame,
4 lbs. rubber packing cloth,
6 yards enameled cloth,
214 lbs. hemp packing,
16 lbs. steam packing,
120 lbs. winding twine,
8 lbs. hemp twine,
4 bbls. charcoal,
4 nuts and tops for Boston hydrants,
950 feet $\frac{1}{8}$ inch gas pipe for thawing service pipe,
45 lbs. tin pipe for thawing service pipe,
1 sand screen,
1 gimlet,
3 tape lines,
1 wood marker,
2 augers,
Patterns for pipe gates, branches, hydrant box frames, &c.,
1 iron bedstead and bedding.

nwp

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1898.

ANNUAL REPORTS

OF THE

COMMITTEE ON WATER,

THE

CITY ENGINEER,

THE

WATER REGISTRAR,

AND THE

WATER COMMISSIONER,

OF THE

CITY OF WORCESTER,

FOR THE YEAR ENDING NOVEMBER 30, 1876.

WORCESTER
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WORCESTER:
PRESS OF CHAS. HAMILTON,
CENTRAL EXCHANGE.
1877.

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ANNUAL REPORT

OF THE

COMMITTEE ON WATER.

To the Council of the City of Worcester:—

In compliance with an ordinance of the City the Joint Standing Committee on Water submit their report, with those of the Water Commissioner, Water Registrar, and City Engineer, for the year ending November 30th, 1876; and for many details we refer to these reports.

WATER SUPPLY.

The past year has proved one of trial and anxiety to the Water Committee. The season was marked by one of the most severe droughts known for many years, and the certainty of having a supply of water adequate to the wants of the city, was, at times, a matter of grave doubt. The breach in the Lynde Brook Dam occurred March 30th, 1876, when the quantity of water stored was 663,330,000 gallons. No apprehensions of a disaster of such a serious nature were entertained till it was apparent the calamity could not be averted, and the committee immediately made arrangements for a temporary supply from other sources.

On the morning following the break, work was commenced laying pipe to make connection with Lynde Brook, and on the same day work was started at Parsons' Brook, with a view to building a temporory dam, and to direct the waters of this brook into the Hunt Reservoir.

The water was turned from Lynde Brook into a twelve inch pipe above the house of George Olney, April 1st, and from Parsons' Brook into Hunt Reservoir April 3d, and from these two sources the city was supplied.

An order passed the City Council, April 11th, authorizing the Committee on Water to procure apparatus for pumping water for the use of the city, till a permanent supply could be procured. Arrangements were perfected with Loring Coes and others to take a supply from Tatnuck Brook, and the reservoirs on this stream were secured. A building was erected at Coes' Reservoir in which boilers were placed, and the steam pump owned by the city was put in operation May 5th.

The supply from Lynde and Parsons' Brooks soon failed, and the necessity of having another pump and boilers was so apparent that the Committee ordered the former of L. J. Knowles and the latter of William Allen & Sons, who furnished the same as promptly as possible. The No. 2 pump was started July 9th, and all the water used by the city has been furnished by pumping from July 22nd to date, and till the dam at Lynde Brook affords a supply the pumps will continue in operation.

New Water Supply.

The Committee do not make any recommendations regarding a new source of supply, as the matter has been yearly brought to the notice of the City Council by previous Committees. We deem it necessary that the pumping-house, with all its fixtures, should be retained for future use, as it is evident that other means for supply will not be sufficient to meet the wants of the city the coming year.

Bell Pond.

This reservoir is connected with the city by a sixteen (16) inch pipe, and the capacity for storage of water is about thirty millions (30,000,000) of gallons. In 1874, the Commissioner, by direction of the Committee, removed about one-third of a large mass of floating vegetable matter, of a fibrous, spongy nature, which injured the quality, and was slowly diminishing the quantity of the water. In view of the fact that next season the new State Lunatic Hospital will draw from this reservoir; also, that complaints are made at times by parties using the water; the Committee earnestly recommend that immediate measures be taken to remove the remaining portion of the island, and that all influences which tend to render the water impure be extirpated.

New Mains.

The recommendation of the Water Committee of last year, that new pipes be laid in certain localities, was deemed important, and in accordance with orders passed by the City Council, new mains have been laid from Lincoln Square through Prescott street to the works of the Ames Plow Co.; also through Grafton street from Washington Square to Providence street; also through Union street from School street to Lincoln Square. Protection from fire in these sections, and the substitution of large for small pipes prompted the action of the Committee. It is important that new mains should be laid in certain parts of the city the ensuing year, and the Committee would recommend the laying of a sixteen (16) inch pipe through Newton street from Pleasant to Elm street; also a twelve (12) inch pipe through Elm street from Newton to Agricultural street, to connect with the eight (8) inch pipe now in Highland street.

Rebuilding of Dam at Lynde Brook.

An order was adopted by the City Council, April 17th, 1876, authorizing the rebuilding and repairing of the dam at Lynde Brook Reservoir, under the supervision of William J. McAlpine, Consulting Engineer, in accordance with plans and specifications prepared by him. These plans were approved by the County Commissioners, and William H. Heywood was appointed superintendent of the work. A contract for the prosecution of the work was made with M. R. Edwards. The foundations for the gate-houses and pipe-wall were carried on as fast as possible, the pipes laid, the flume removed, and the stone work of the gate-houses nearly completed about the first of July.

A communication from the City Engineer, addressed to His Honor the Mayor, under date of July 6th, caused inspections of the work which resulted in the appointment, by the County Commissioners, of a Committee of Inspection, consisting of George Crompton, Albert Curtis, and Esek Saunders, under whose careful observation the dam has been raised to its present height.

On the 19th of July, Mr. Heywood resigned his position, and Samuel A. Prescott was appointed, who voluntarily resigned in twenty days after acceptance, when Mr. Heywood resumed his former position under direction of the Committee, and who remained till cessation of work at the dam.

The gully on the west side under the old gate-house proved to be more formidable than was supposed, being eighteen feet below the present pipes, which made the cleaning out very slow and expensive work. The foundation work was performed under the personal supervision of William J. McAlpine.

The Commission requested that an excavation be made fifty-five feet east of the pipe-wall, to be replaced with puddle which was acceded to by the Committee. This work has proved to be very slow and costly, and it being impossible to keep the puddle up to the filling, the completion of the dam was prevented this season.

Labor ceased at the dam December, 1st 1876, at which date the height of the work was within nine feet of the top of the old embankment, with grading to be finished on the south side.

The cost of construction of the dam to the present time is as follows:—

Cost of building embankment, &c.,	$57,874 64
Pipes, gates, branches, &c.,	7,502 40
Cost of pipe wall,	3,445 85
Expense of gate-houses,	4,608 13
Building temporary flume,	870 00
Total,	$74,301 02

Estimated cost of completion not to exceed $5,000.

REMARKS.

The quantity of water stored at this date in the Lynde Brook Reservoir, is one hundred and eleven millions (111,000,000) of gallons, with the water eleven and one-half (11½) feet in depth. There can be stored with safety, twenty-eight and one-half (28½) feet, or four hundred and fifty-three millions (453,000,000) of gallons, and still leave the water four (4) feet below the top of the new embankment.

THE DEPARTMENT.

An inspection of shops, store-houses, yards and stock belonging to the Department shows that they are kept in excellent condition. The Committee desire to commend the Commissioner for vigilance in the discharge of his duties the past year, which at times have been very arduous, requiring his attention at all hours, night and day.

The Water Registrar holds a position which is accompanied by trials little known to the citizens at large, and is an office not easily filled. The Committee wish to acknowledge the efficiency of the present Registrar in all the duties pertaining to his office and his uniform courtesy to all. The salaries of the Commissioner and Registrar are far below those in other cities, and their positions and responsibilities should insure better compensation.

The Committee cannot close this report without stating the fact that the thanks of the City are due to the Knowles Steam Pump Works for changing the steam cylinder to No. 1 Pump, increasing the capacity of the same, without any expense to the City.

Respectfully submitted.

SAMUEL D. HARDING,
HARRISON BLISS,
GEORGE GEER,
G. J. RUGG,
W. H. HEYWOOD,
Joint Standing Committee on Water.

WORCESTER, December 18th, 1876.

REPORT OF CITY ENGINEER

TO THE

COMMITTEE ON WATER.

To the Joint Standing Committee on Water:

Gentlemen.—In compliance with the provisions of Chap. 68, Sect. 11, of the Ordinances of the City, the following Report, relating to Water Works is respectfully presented.

Immediately after the break in the dam at the storing reservoir, a temporary dam was constructed to divert the waters of Parsons' Brook into the distributing reservoir at Hunt's. This dam was built in about forty-eight hours, work being prosecuted day and night. No material suitable for an earth dam being at hand (the formation being an almost impalpable sand, which alone would not stand the action of water), a very common form of construction in such cases was adopted. The excavation for foundation disclosed a perfect nest of boulders, which it was necessary to remove; these were placed in the form of a revetment wall, the foundation being laid in hydraulic cement; the wall forms the down stream portion of the dam; above this a triangle of earth was placed, the slope being 1½′ horizontal to 1′ vertical. Instead of placing a spiling in the heart of the dam, which would have required a flatter slope, and width of bank of at least ten feet on top, and thus increase the amount of material used many times over, the water slope was protected with plank. By this method of construction the sandy earth is confined and the dam becomes more impervious to water with age, the sand settling and becoming more compact, in fact *puddling itself*, which the haste of construction did not permit to be done by hand. The width of the base of the dam in the bed of the stream is 30 feet. Had the ordinary dimensions of an earth dam been followed it would have been 79 feet. In case the water rights of Parsons' Brook should in the future be acquired by the city, as has been suggested by former Committees, this dam can be made a permanent structure by placing an embankment of the material at hand 10 feet in width on top, with water slope of 2 to 1, and paving with field stone. The plank on the present slope would then be a plank spiling in the heart of the dam. The pipe line connecting with the Hunt Reservoir is of wrought iron, which the Water Department had on hand but did not consider suitable for ordinary purposes under head pressure; as now laid it is free from severe strain, and will answer the purpose for many years. In order to get the requisite capacity of flow through this pipe the dam was built the height adopted for head pressure. No data to determine the amount of water to be dealt with was accessible, but the Water Commissioner informs me the pipe, under full head, was just capable of passing the flow of the brook after the severe storm of July 30th, when the Brook reached perhaps its usual maximum flow, thus establishing the correctness of the dimensions adopted. No attempt was made to secure storage on the Brook. The storage capacity controlled by this dam is approximately as follows:

Pool on Parsons' Brook,	371,000 galls.
Hunt's Reservoir,	3,730,000 "
Chandler Hill Reservoir,	540,000 "
Total,	4,641,000 galls.

The value of this Brook as a supplement to our present source of supply has never been ascertained. The storm of July 30th supplied the city for several days, pumping being suspended.

I think it would be advisable to survey the water-shed of the Brook, the only way to determine its value accurately, and if the results are deemed favorable, and the water rights can be secured at a reasonable expense, it would be judicious to attain it as an auxiliary to our present supply. The rainfall this summer having been very light, as will be seen by inspection of the appended table, it has been of little assistance.

Respectfully submitted.

C. H. M. BLAKE, *City Engineer.*

WORCESTER, MASS., Dec. 9th, 1876.

SHO AINFALL DURING THAT PERIOD.

Date.	1875. DECEMBER.		187 JANU	BER.	NOVEMBER.		REMARKS.
	Water.	Rainfall.	Water	Rain fall.	Water.	Rainfall.	
1	4′ 10¼″	....	6′ 3¼″	0.49	......	....	Yearly rainfall, 43.82 inches.
2	5′ 0 ″	....	6′ 2¼″	....	......	....	
3	5′ 1 ″	....	6′ 1¾″	...	......	.09	
4	5′ 2 ″	...	6′ 2¼″	....	......	....	
5	5′ 2¾″	....	6′ 3 ″	....	......	....	
6	5′ 3½″	....	6′ 3½″	0.17	......	....	
7	5′ 3¾″	....	6′ 4¼″	0.10	......	.71	
8	5′ 4¾″	....	6′ 5 ″	....	......	.71	
9	5′ 5¼″	0.10	6′ 5 ″	....	......	.09	
10	5′ 5¼″	0.05	6′ 3½″	....	......	....	
11	5′ 6 ″	....	6′ 3¼″	....	......	.30	
12	5′ 6½″	....	6′ 3¾″	....	......	.48	
13	5′ 7¼″	....	6′ 4¾″	....	......	....	
14	5′ 8¼″	....	6′ 5¾″	....	......	....	
15	5′ 9 ″	....	6′ 7 ″	0.35	......	....	
16	5′ 9½″	0.09	6′ 8 ″	....	......	....	
17	5′ 10¼″	0.14	6′ 8¾″	....	......	....	
18	5′ 11 ″	....	6′ 9½″	....	......	....	
19	6′ 0½″	....	6′ 8 ″	....	......	....	
20	6′ 1½″	.. .	6′ 6½″	....	......	.20	
21	6′ 2½″	....	6′ 7 ″	....	......	1.13	
22	6′ 3 ″	0.08	6′ 7¾″	....	......	....	
23	6′ 3¼′	....	6′ 8¼″	....	......	.05	
24	6′ 3¼″	....	6′ 8¾″	0.70	......	....	
25	6′ 3 ″	0.48	6′ 9½″	....	......	....	
26	6′ 3½″	....	6′ 10¾″	....	......	....	
27	6′ 3 ″	0.15	6′ 11½″	....	......	....	
28	6′ 2½″	....	7′ 0 ″	....	......	.12	
29	6′ 2¾″	....	7′ 0¼″	....	......	....	
30	6′ 3¼″	....	6′ 9 ″	....	......	...	
31	6′ 3¾″	....	6′ 9 ″	.. .	......	....	
	Totals,	1.09		1.81		3.88	

REPORT

OF THE

WATER REGISTRAR.

WORCESTER, Dec. 18, 1876.

To the Joint Standing Committee on Water:—

GENTLEMEN,—In conformity with Section 8 of the "Ordinance relative to Water," I respectfully present the following report for the year ending November 30th, 1876.

During the year, one hundred and eight (108) applications for water were received, all of which but four were granted and the service pipes laid.

I rendered to the City Treasurer for collection the following water bills:—

By Meter,	3,620	amounting to	$51,032 09
Assessment,	7,746	" "	47,553 05
Total,	11,366	" "	$98,585 14

The water was shut off from the premises of ninety-one (91) water takers on account of unpaid over-due bills for water and labor furnished, and immediately turned on upon the payment of bills.

Abatements amounting to $27,695.32 were made owing to parties ordering meters, on account of tenements vacated three months or more, for correction of assessments, and per order of Committee.

The quantity of metered water consumed, including waste and leakage, is as follows:—

From October, 1875, to April, 1876,	102,404,676 gallons,
" April, 1876, to October, 1876,	120,051,928 "

METERS.

During the year six hundred and fifteen (615) meters have been placed on the works, making at the present time in use twenty hundred and ninety; the sizes and kinds of which are as follows:—

	⅝ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.
Union,	1,257	286	54	9	23	1	—
Desper (new),	364	32	2	—	—	—	—
Gem,	16	—	1	—	1	1	3
Worthington,	1	2	—	—	—	—	—
Desper (old),	37	—	—	—	—	—	—

Great progress has been made the past year in the introduction of meters, and consumers pay their assessments more cheerfully by meter rates than otherwise. The fact that readings are taken monthly, serves as a regulator, and unusual quantities of water registered are accounted for generally to the satisfaction of the taker. A short experience is often necessary to convince persons that a careless use of water increases the amount of their bills, and simply placing a meter on a service pipe with fixtures in poor condition does not always decrease the bill. If the disagreeable result should occur from defective water pipes, which would ensue from gas fixtures in a similar state, the waste of water would be limited, complaints of large bills less frequent, and the accuracy of meters not so frequently questioned.

REPORT OF WATER REGISTRAR.

WATER RATES.

One of the many unpleasant things in connection with the Water Office is the failure to satisfy all takers that their assessments are just. The rates are established, and a party must pay accordingly, whether a quart or barrel of water is consumed. In such cases the advantage of a meter is obvious, and but for the expense many parties would possess one. In some cities an annual rental is assessed the water taker, the city furnishing and owning the meter, and liable for repairs.

The desire of the officers in the Water Department has been to act justly and impartially toward all, conscious of the fact that they have public trusts to manage. Many persons make demands as though they deemed it optional with the officers to comply or refuse, the parties forgetting that any private or pecuniary interest does not belong to those in the department beyond that of any citizen. In many instances, where the ordinance has been enforced for non-payment of bills, the officers were compelled to listen to language of such a personal nature that courtesy seemed a farce.

The opinion that the city should furnish water at no cost, has not been expressed during the year by those having the welfare of the city at heart. Some people are accustomed to regard water as free and inexpensive as air, and not till they are convinced that it is a necessity as well as a luxury, will they appreciate the expense which the city incurs annually in the maintenance thereof.

LICENSED PLUMBING.

I called the attention of the committee of last year to the fact that a large amount of plumbing work was being done which deserved condemnation. The same state of things has existed this year, and the importance of licensed plumbing is manifest. The ignorance of many professing their knowledge of plumbing is so apparent, that in some cities their licenses would be revoked after their first attempt at making a joint or connecting a waste-stop. Numerous instances have occurred, where parties made complaints at this office concerning enormous charges demanded by plumbers for trivial jobs of work. Many owners of property have paid the penalty for engaging low priced work, and the city is generally the loser through a waste of water, the result of defective fixtures.

To dilate upon the subject of waste would be to reiterate what has been written in reports connected with the Water Departments for years. The presence of meters has detected many elephantine leakages this year, and but for the number upon the works the cost of pumping water would have exceeded the amount expended. If all the avenues of waste were closed, and did people really exercise discretion in the use of water, our anticipated source of supply would be ample for years to come.

Respectfully submitted.

J. STEWART BROWN,

Registrar.

REPORT

OF THE

WATER COMMISSIONER.

To the Joint Standing Committee on Water:

The Commissioner presents his Annual Report for the year ending November 30, 1876.

After the break in the dam at Lynde Brook Reservoir, which occurred March 30, the only source of supply left for the city was Bell Pond, containing 30,000,000 gallons that could be drawn.

As the daily consumption was 3,000,000 gallons, arrangements had to be made at once for procuring an additional supply. A connection was made with that part of the 12-inch pipe from Lynde Brook to the Hunt Reservoir, on this side of the valley below the dam, and a pipe laid upon the surface of the ground to connect with the water of Lynde Brook, and, April 1st, a portion of this water was again running into the Hunt Reservoir.

At the same time work was also commenced to turn the water of Parsons' Brook, which was done by laying 785 feet of the wrought iron pipe which the city had on hand, and was so far completed as to let the water from this source into the Hunt Reservoir April 3rd.

As all the supply available was only temporary, arrangements were made to procure an additional supply by pumping. In compliance with an order, passed by the City Council April 11th, authorizing the Committee to procure necessary apparatus for pumping, Wm. Allen & Sons were engaged to build and deliver at New Worcester, by May 1st, two tubular boilers, capable of furnishing 100 horse power.

A 12-inch pipe was laid from the 16-inch main on Newton street to the pond of Loring Coes & Co., a building erected, and the pump started May 5th, and run four days, when the rains had so increased the amount of water on hand as to supply the city until June 5th, when pumping again became necessary, and has continued to the present time.

The continued drought of the season soon reduced the supply, and another pump and boiler were ordered June 12th, and put in operation July 9th. A fourth boiler was afterward set, and all the water used since July 14th has been furnished by the pumps.

The expense of building, pumps, boilers, connections, &c., amount to $11,260.97.

The running expenses to December 1st have been:

Coal,	$6,843 65
Oil, waste, packing, &c.,	95 44
Labor,	1,474 54
	$8,418 63

MAIN PIPES.

Main pipes have been laid in streets where ordered by the City Council, except 75 feet on Union street, south of School street; this cannot be done until the buildings on the west side of Union street are removed.

Hancock street,	178 ft. 4 in. pipe.
Larch street, to connect with Winslow street,	102 " " "
Prescott street, from Lincoln sq. to Concord st.,	728 " 12 in. "
Winslow street, from Pleasant st. to Austin st.,	819 " 4 in. "
Amount of new pipe laid this year,	1,822 ft.

By a change of grade in Crown street, it was necessary to relay 300 feet of 2 inch pipe south of Chatham street. A 12 inch pipe has been laid in Washington Square and Grafton street, from Summer to Water street, in place of the 4 inch pipe which was taken out. In Prescott street, from Concord street to the buildings of the Ames Plow Co., a 12 inch pipe has been laid in place of six inch. In Union street, from Lincoln Square to School street, a 12 inch pipe has been laid in lieu of the 10 inch taken out, to allow the construction of Mill Brook sewer.

In the above streets, 6 inch coated cast iron pipe has been used for branch pipes to hydrants, in place of 4 inch, formerly used, thereby giving greater capacity to the hydrants and preventing loss of head by tubercular formation as in small pipes.

A great portion of the 12 inch pipe from Lynde Brook reservoir to the Leicester road, not injured by the breaking of the dam, was so filled with gravel as to render it unfit for use, and the 20 inch pipe was broken for a distance of 1,277 feet, both of which have been relaid.

Pipe relaid:—

Crown street,	300	ft.	2	inch	pipe.
Grafton street,	1,205	"	12	"	"
Prescott street,	1,869	"	"	"	"
Union street,	1,022	"	"	"	"
Through Dam,	680	"	24	"	"
Below Dam,	1,277	"	20	"	"
" "	2,100	"	12	"	"
Amount of pipe relaid,	8,453	ft.			

The basin of the reservoir has been cleared of the vegetable growth of the season and burned over as well as the nature of the ground would permit.

The number of gates set, 6; hydrants, 19; service pipes laid, 104, or 2,368 feet pipe for the city and 2,345 feet for applicants; meters, 615; leaks repaired, 102; on main pipe, 75; joint, 43; rust, 27; settling of earth, 3; soldered branch, 1; plug, 1; gate, 1; hydrants, 5; on service pipe, 21; lead connections, 16; split, 2; coupling, 1; stop, 1; union joint, 1. Stoppages in service pipe reported, 115. Hydrant boxes renewed, 39; gate boxes, 25; stop boxes, 25.

Location of hydrants set during the year:—

Eastern avenue, corner Prospect street.
Edward street, " Belmont street.
Grafton street, " Temple street.
" " " Water street.
" " at Washington square.
Hollis street, corner Gardner street.
Kilby street, " Hollis street.
Lincoln street, opposite Perkins street.
Nashua street, at Ames Plow Co.
Oak avenue, between Kendall and Catharine streets.
Prescott street, at Whitcomb's Envelope Factory.
" " " Witherby, Rugg & Richardson's.
" " " Ames Plow Co.
" " " " " "
Salisbury street, corner Forest street.
" " " Grove street.
Union street, at Market street.
" " " Lincoln square. } Changed from old location of
" " " Court mills. } Union street.
Winslow street, corner Larch street.
Wyman street, corner Hollis street.

The value of stock and tools on hand November 30, as per inventory accompanying this report, is $38,968.82.

Respectfully submitted.

FRANK E. HALL,

Water Commissioner.

WORCESTER, *Dec.* 18, 1876.

INVENTORY OF STOCK AND TOOLS ON HAND DECEMBER 1, 1876.

6 pieces 24 inch cast iron pipe,
61 pieces 20 inch cast iron pipe,
60 pieces 16 inch cast iron pipe,
16 pieces 12 inch cast iron pipe,
23 pieces 8 inch cast iron pipe, class B,
109 pieces 8 inch cast iron pipe, class A,
10 pieces 6 inch cast iron pipe,
3 pieces 20 inch cast iron pipe, been used,
11 pieces 10 inch cast iron pipe, been used,
180 pieces 6 inch cast iron pipe, been used,
128 pieces 5 inch cast iron pipe, been used,
32 feet 24 inch cast iron pipe,
25 feet 20 inch cast iron pipe,
125 feet 16 inch cast iron pipe,
65 feet 12 inch cast iron pipe,
35 feet 8 inch cast iron pipe,
312 feet 4 inch cast iron pipe,
200 feet 6 inch cast iron pipe, been used,
200 feet 4 inch cast iron pipe, been used,
210 feet 12 inch cement lined pipe,
1,589 feet 10 inch cement lined pipe,
1,596 feet 8 inch cement lined pipe,
434 feet 3 inch cement lined pipe,
700 feet 2 inch cement lined pipe,
72 feet 20 inch cement lined pipe, been used,
137 feet 16 inch cement lined pipe, been used,
107 feet 12 inch cement lined pipe, been used,
273 feet 10 inch cement lined pipe, been used,
784 feet 6 inch cement lined pipe, been used,
950 feet 4 inch cement lined pipe, been used,
330 feet 2 inch galvanized iron pipe,
4 20 inch curve pieces,
6 16 inch curve pieces,
6 12 inch one-eighth turns,
8 8 inch one-eighth turns,
10 6 inch one-eighth turns,
20 4 inch one-eighth turns,
4 16 inch quarter turns,
6 12 inch quarter turns,
6 8 inch quarter turns,
5 6 inch quarter turns,
5 4 inch quarter turns,
1 2 inch quarter turn, brass,
1 24 inch branch,
4 16x16 inch branches,
5 16x12 inch branches,
2 16x8 inch branches,
7 16x6 inch branches,
12 16x4 inch branches,
5 12x12 inch branches,
1 12x8 inch branch,
9 12x6 inch branches,
5 12x4 inch branches,
1 10x6 inch branch,
4 10x4 inch branches,
14 8x8 inch branches,
39 8x6 inch branches,
8 8x4 inch branches,
53 6x6 inch branches,
42 6x4 inch branches,
11 5x4 inch branches,
39 4x4 inch branches,
142½ set sleeves for cement lined pipe,
117 sleeves for cast iron pipe,
18 set ½ sleeves with bolts,
2 20x16 inch tapers,
2 16x12 inch tapers,
6 12x8 inch tapers,
3 12x6 inch tapers,
19 8x6 inch tapers,
15 6x4 inch tapers,
3 4x3 inch tapers,
4 4x2 inch tapers,
2 24 inch bonnets,
1 16 inch bonnet,
2 12 inch bonnets,
16 8 inch bonnets,
22 6 inch bonnets,
33 4 inch bonnets,
1 20 inch plug,
1 16 inch plug,
8 12 inch plugs,
3 8 inch plugs,
16 6 inch plugs,
19 4 inch plugs,
1 12 inch gate,
1 10 inch gate,
17 8 inch gates,
14 6 inch gates,
15 4 inch gates,
6 gate boxes,
11 gate box frames,
17 gate box covers,
8 gate box frames and covers (small),
16 hydrants,
3 flush hydrant boxes,
11 flush hydrant box frames and covers,
19 hydrant wastes,
12 hydrant bowls,
2 brass screws for hydrants,
22 valves for hydrants,
21 nozzles for hydrants,
2 brass tops for hydrants,

40 hydrant caps,
3 pieces cast iron pipe for hydrant bowls,
150 lbs. post hydrant box hoops,
170 lbs. post hydrant box fastenings,
150 lbs. bolts and nuts for hydrants,
318 lbs. cast iron bands for repairing solder branches,
1,147 lbs. wrought iron bands and bolts for street branches,
347 feet rubber coated pipe,
4,000 feet 1 inch cement lined pipe,
5,147 feet ¾ inch cement lined pipe,
1,077 lbs. lead pipe,
50 lbs. solder,
220 lead connections,
80 lead connections, been used,
2 3 inch globe valves,
17 Ludlow gates,
28 ½ inch stops for bands,
107 ½ inch stops for bands, been used,
123 waste stops,
2 2 inch brass unions,
10 2 inch long brass nipples,
24 2 inch short brass nipples,
117 cast iron stop boxes,
231 cast iron stop box covers,
5,892 lbs. tapping bands,
717 lbs. bolts and nuts for service pipe,
297 brast tees,
243 galvanized iron tees,
268 plugs,
24 combination nipples,
323 galvanized iron nipples,
58 rubber coated nipples,
143 thimble couplings,
24 galvanized iron reducing couplings,
2 malleable iron unions,
25 rubber coated elbows,
543 galvanized iron elbows,
94 brass elbows,
109 rubber packings for tapping bands,
14 meters,
2 meter box frames and covers,

At Pumping House.

Building,
2 Knowles' large steam pumps,
2 Knowles No. 3 steam pumps,
4 boilers,
2 heaters,
pipe, connections, &c.,
1 12 H. P. Haskins engine,
1 12 H. P. portable engine,
tools,
1 Knowles rotary pump,
5 boiler pumps,
2 force pumps,
2 copper pumps,
1 wooden pump,
3 tool boxes and chests,
33 wheelbarrows,

76 picks,
4 pick handles,
88 shovels,
15 iron bars,
14 iron tampers,
11 striking hammers,
4 stone hammers,
2 nail hammers,
7 hand hammers,
2 paving hammers,
19 hammer handles,
245 lbs. steel in drills,
17 hand drills,
6 iron spoons,
4 ladles,
72 cold chisels,
24 steel sets,
5 packing irons,
1 large furnace and ladle,
4 furnaces,
23 monkey wrenches,
10 Baxter wrenches,
31 pair pipe tongs,
10 hand axes,
12 long handled axes,
4 axe handles,
1 adze,
6 hand saws,
2 bit stocks and bits,
1 saw set,
2 try squares,
2 planes,
1 drawing knife,
1 grindstone,
1 oil stone,
2 screw drivers,
2 hoes,
1 bog hoe,
1 spirit level,
4 oilers,
8 trowels,
3 soldering furnaces and tools,
1 powder can,
21 files,
2 pair plyers,
2 paving rammers,
1 ratchet and drills,
3 pair tongs for lifting pipe,
5 hay knives,
18 long handled forks,
6 scythes and 12 snaths,
3 spoons for cleaning stop boxes,
6 hooks for removing hydrant waste
3 forks for removing hay from hydrants,
5 Stanwood's pipe cutters,
1 Chase patent pipe cutter and 14 dies,
5 pipe taps,
1 packing box tap,
6 packed drill stocks and 14 drills,
7 die plates and 18 dies,
12 stop wrenches,

12 gate wrenches,
12 hydrant wrenches,
3 wrenches for repairing hydrants,
1 platform scale,
9 set cones for lining pipe,
9 set cones for lining service pipe,
5 rubber cones,
2 wagons,

1 Concord buggy,
1 sleigh,
1 harness,
1 hand cart,
3 derricks,
3 set pulley blocks and ropes,
8 dies for cutting packing,
Lot of tools for building hydrants.

MISCELLANEOUS.

1 fire alarm gong,
1 test pump and gauge,
6 furnace grates,
3 galvanized iron boilers,
1 copper boiler,
2 boilers for thawing hydrants,
1 press for lining service pipe,
1 tank for testing meters,
37 water pails,
1 truck,
1 hand sled,
3 mixing boxes,
19 pair rubber boots,
7 brooms,
2 coal hods,
77 lanterns,
11 lantern globes,
4 bracket lamps,
2,000 feet chestnut lumber,
3,000 feet lumber, been used,
3,168 feet spruce timber, been used,
539 lbs. pig lead,
330 lbs. old lead,
18 lbs. white lead,
520 lbs. chains,
233 lbs. rosin,
58 lbs. wire rope,
125 lbs. 1 inch rope,
127 pickets for reservoir fence,
13 pair rubber mittens,
3 cast iron sinks,
5 stoves,
1 goose neck,
463 feet rubber hose,
6 2½x2 inch hose nipples,
5 tea kettles,
45 tin dippers,
2 zinc dripping pans,
2 quart measures,
5 tunnels,
2 pruning hooks,
6 wooden rollers,
1 anvil,
1 portable forge,

2 fan blowers,
3 iron vises,
2 wood vises,
3 pair shears,
1 drinking fountain,
1½ tons coal,
1 handle basket,
4 carpenters' horses,
5 steam gauges,
1 oil tank,
82½ gallons kerosene oil,
2 jack screws,
14 iron screws,
4 ladders,
800 bricks,
2 desks,
5 office chairs,
4 window frames,
5 oil cloth suits,
1 canvas tent and frame,
10 lbs. rubber packing cloth,
2 yds enameled cloth,
125 lbs. hemp packing,
12 lbs. steam packing,
125 lbs. winding twine,
52 lbs. manilla twine,
7 oil cans,
6 bbls. charcoal,
3 bbls. Portland cement,
56 bbls. cement,
2 nuts and taps for Boston hydrants.
956 feet ⅛ inch gas pipe for thawing service pipe,
45 lbs. tin pipe for thawing service pipe,
patterns for pipe, gates, branches, hydrant box frames, &c.,
3 sand screens,
1 gimlet,
1 tape line,
1 wood marker,
2 augers,
1 iron bedstead and bedding,

Year 1877 missing

P 36861
ASTOR, LENOX AND
TILDEN FOUNDATIONS
1899.

ANNUAL REPORTS

OF THE

COMMITTEE ON WATER,

THE

CITY ENGINEER,

THE

WATER REGISTRAR,

AND THE

WATER COMMISSIONER

OF THE

CITY OF WORCESTER,

FOR

THE YEAR ENDING, NOVEMBER 30, 1878.

WORCESTER:
PRESS OF NOYES, SNOW AND COMPANY,
47 MAIN STREET.

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WORCESTER:
PRESS OF NOYES, SNOW AND COMPANY,
47 MAIN STREET.

REPORT

OF THE

JOINT STANDING COMMITTEE ON WATER.

To the Council of the City of Worcester:—

In conformity with an Ordinance of the City, the *Joint Standing Committee* on *Water* submit their report, with those of the *Water Commissioner*, *Water Registrar*, and *City Engineer*, for the year ending November 30, 1878.

WATER SUPPLY.

The unusual quantity of rain which fell during the past year served to furnish an ample supply of water, and the largest storage attained was April 26th, when the depth of the water was thirty-eight and three-tenths (38.3) feet. By a decree of the Court, the committee was authorized to place six inches of flash-boards on the rollway, which retained a surplus of water from March 21st, till May 24th, at which date the water was even with the rollway. The supply on hand at the present time is larger than ever before at a corresponding season of the year.

The peculiar taste and odor of the water during the month of May was the source of much just complaint, and the cessation of the trouble was a cause of rejoicing. Investigations were made, and measures instituted to improve the quality of the water. Reports from neighboring cities similarly afflicted, contain lengthy statements as to the probable cause, but as yet no positive knowledge has been obtained.

THE DAM.

The dam, gate houses, etc., are at present in excellent condition. The rollway has been thoroughly repaired, the shores of the reservoir have been cleared of debris, the land at the upper portion has been burnt over, and everything done which might tend to improve the quality of the water. The man who is stationed at the reservoir is deemed reliable, and the property of the city seems well cared for.

BELL POND.

This reservoir is at present filled, and the quality of the water is superior to that of former years, which is owing, in a great measure, to the removal of the floating mass of vegetable matter, which was done last year. Much more work in the way of improvements could be performed, and we refer to the recommendations of the Commissioner, which are worthy of attention.

THE DEPARTMENT.

In accordance with an Ordinance, the Committee made the annual inspection of reservoirs, shops, stock, etc., and report everything in a satisfactory condition. The office in the hall has been connected by telephone with the works on Thomas street, which greatly facilitates the transaction of business. The duties of Commissioner and Registrar have been faithfully performed and the associations existing between them and the committee have been of a pleasant nature.

Respectfully submitted,

CHAS. B. PRATT,
M. A. LAPHAM,
WM. DICKINSON,
GEO. E. BOYDEN,
J. A. TITUS,
FRANCIS PLUNKETT,
WILLIAM H. HEYWOOD.

Joint Standing Committee on Water.

WORCESTER, December 20th, 1878.

REPORT

OF THE

WATER COMMISSIONER.

To the Joint Standing Committee on Water:

The Commissioner presents his annual report for the year ending November 30, 1878.

The rollway at Lynde Brook reservoir has been repaired by relaying with cement mortar the retaining wall on the westerly side.

All the loose stones in the paving of the bottom were taken out and cement and small stones filled in to an average depth of two feet.

The work commenced last year, of removing stumps from the reservoir, has been continued as far as the water was drawn.

The wood on the Holbrook land has been cut from both banks of the brook, and the land thoroughly cleared. The course of the brook is very crooked, and a large space had to be cleared, as when heavy storms occur the water flows over the valley, carrying a large amount of rubbish into the reservoir. If a straight trench of sufficient capacity to carry the storm water was dug from the road, as far as the land is cleared, this might be prevented at less expense than clearing the land every year.

The quality of the water has been good, except in May, when a fishy taste and odor appeared. Such examination as was made, showed this trouble was less upon the surface than a few feet below, though the odor could be noticed at some distance from the reservoir. The bottom of the upper gate was 8.3 feet below water, which was at the rollway.

A frame arranged for stop plank was put over the upper gate to draw from the surface, but owing to the temporary nature of the work, and the difficulty of working below the water, only a part of the water used was taken from the surface. To the relief of all, this trouble disappeared in about three weeks, apparently as quickly as it came.

A cast iron frame, with grooves for plank and screen, has been put over the upper gate, and water is now taken from the surface.

The Hunt reservoir was cleared out, and a stand pipe put on the end of the inlet pipe, so as to discharge above the water instead of at the bottom, as formerly. Stone monuments were set at corners of land below this reservoir, as directed by the Committee.

BELL POND.

The water here is better than formerly, though the slaughter house on the east, the two houses on the west, with their drainage towards the pond, and in summer the cattle on the southerly side suggest very forcibly that an improvement of the surroundings is needed. Some repairs will have to be made upon the dam next spring, as in places it is badly washed.

The reservoir on Chandler Hill, formerly supplied from Bell Pond, has not been used since the high service pipe was laid. Its capacity is only about one million gallons, and it is lower than high water in the Hunt reservoir, and the waste at night was so large that water was shut off. The fence has received some repairs annually, but the boys who frequent this locality, are fast destroying the fence and paving.

The advisability of removing the fixtures and discontinuing this reservoir is presented for consideration.

DISTRIBUTION.

Pipe was laid during the year as follows;

8 inch,	Edgeworth street, from Milton to Byron streets,	1,313 feet.
6 "	Mulberry street, from Prospect street south	206 "
6 "	Winter street, from Mill Brook to Water Street,	435 "
6 "	Grand Street Place, from Grand street,	25 "
4 "	Carroll street, to connect with Laurel street,	98 "
2 "	Grand Street Place,	211 "
	Number of feet of new pipe laid,	2,288

PIPE RE-LAID.

In Elm street, 648 ft. 4 in. 1,328 ft. 6 in. and 1,221 ft. 8 in. was re-placed with 3,197 ft. of 12 inch.

A change in the grade of Jackson street made it necessary to re-lay a part of the pipe in this and Beacon street. 909 feet of 8 in. was laid in Jackson street in place of 6 inch. 224 feet of 4 in. re-laid in Beacon street.

Number of feet of pipe re-laid,	4334
Number of gates set,	11
Number of gates taken out,	6
Number of new gates set,	5

Location of hydrants set:—

Barclay street, corner of Waverly street.
Edgeworth street, corner of Dryden street.
" " between Dryden and Sigourney Street.
" " corner of Byron Street.
Elm Street, corner of Main Street.
Grand Street, corner of Grand Street Place.
Houghton Street.
Main Street, corner of Jackson Street.
Winter Street, east of Mill Brook.
Number of hydrants set, 9.

Number of Service Pipes laid,	151
" feet laid for city,	3,207
" " " individuals,	3,355
" " laid this year,	6,562
" Meters set, 540.	

Bills for labor and materials have been rendered to the Treasurer for collection, to the amount of $14,379.77; amount uncollected November 30th, 1878, $1,378.84.

Number of leaks repaired, 60. On main pipe, 47, viz: Rust, 20; Joint, 26; Split pipe, 1. On service pipe, 12, viz: Lead connection, 6; Union, 1; Coupling, 1; Tee 1; Valve, 2; Stop, 1. On hydrant, 1 broken bolt.

Nine hydrant boxes, 19 gate boxes, and 48 stop boxes have been set to replace old ones. 123 stoppages in service pipe removed.

The appraised value of personal property on hand November 30th, as per inventory, $30,622.37.

Respectfully submitted,

F. E. HALL,

Water Commissioner.

WORCESTER, Dec. 20, 1878.

[illegible]
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[illegible]

MAIN AND DISTRIBUTION PIPE LAID TO NOVEMBER 30, 1878.

	2 inch.	3 inch.	4 inch.	5 inch.	6 inch.	8 inch.	10 inch.	12 inch.	16 inch.	18 inch	20 inch.	24 inch	Length in miles.	Gates.	Hydrants.
Prior to 1864	....	....	19,697	2,822	12,674	5,159	....	......	......	......	......	......	7.642	35	...
1864	....	....	4,197	....	3,744	63	....	7,166	13,309	1,980	1,056	......	5.968	12	152
1865	144	....	8,946	....	6,259	5,769	3,455	886	2,255	......	......	......	5.248	49	65
1866	982	....	10,211	....	1,624	11,266	....	......	2,915	......	273	......	5.165	42	36
1867	2,564	3,487	8,964	....	2,197	8,402	....	1,474	1,374	......	......	......	5.39	57	56
1868	2,194.8	1,540. 5	14,585.57	....	3,206	1,850. 5	....	......	......	......	......	......	4.427	47	35
1869	5,129.6	2,312.25	20,428.53	....	10,642.53	4,102.97	1,004.16	2,725	......	......	......	......	8.796	109	45
1870	1,469	365. 5	14,745	....	9,335	3,791. 5	....	......	......	......	......	......	5.626	64	29
1871	340	345	19,110	....	10,052	5,690	627	......	......	......	......	......	6.849	80	39
1872	421	226	4,420.25	....	7,307	....	2,032	2,656	8,916	......	13,801	......	7.534	42	9
1873	....	....	5,736.75	....	9,714	5,691	....	2,845	11,554	......	......	......	6.731	46	35
1874	....	....	3,058.91	....	6,170	5,948	....	3,724	8,330	......	......	......	5.157	37	26
1875	....	....	562	....	2,257.25	1,150	....	......	3,534	......	......	......	1.421	49	28
1876	....	....	1,122.25	....	140.75	....	....	4,819	......	......	......	700	1.284	23	19
1877	....	....	349. 5	....	919	1,086. 5	....	3,016	1,029	......	56	......	1.222	21	18
1878	211	....	326	....	666	2,222	....	3,197	......	......	......	......	1.254	11	9
Total,	13,455.4	8,276.25	136,459.76	2,822	86,907 53	62,191.47	7,118.16	32,508	53,216	1,980	15,186	700	79.714	724	601
Pipe taken up,	349	....	7,893	1,335	4,786	1,221	1,800	.....	330	......	......	......	3.354	29	
Total in feet,	13,106.4	8,276.25	128,566.76	1,487	82,121.53	60,970.47	5,318.16	32,508	52,886	1,980	15,186	700	76.360	695	601
Total in miles,	2.482	1.567	24.35	.282	15.553	11.548	1.007	6.157	10.014	.375	2.876	.133	.....	....	...

SERVICE PIPE LAID TO NOVEMBER 30, 1878.

	LAID FOR CITY.		LAID FOR INDIVIDUALS.		No.
	In Feet.	In Miles.	In Feet.	In Miles.	
Prior to 1865............	3,800.	.719	....	....	129
1865............	5,979.83	1.132	3,538.67	.672	207
1866......... ...	8,592.39	1.627	7,930.95	1.502	284
1867.........	11,231.46	2.127	12,938.01	2.45	388
1868............	13,237.24	2.507	11,343.59	2.148	504
1869	17,958.14	3.401	12,855.87	2.435	673
1870............	11,403.95	2.160	11,562.01	2.19	581
1871............	10,089.36	1.911	9,149.6	1.733	504
1872............	7,444.75	1.41	6,811	1.29	357
1873............	6,004.91	1.137	7,241	1.371	315
1374............	4,773.83	.904	6,009.5	1.138	231
1875............	4,171.25	.79	5,568.75	1.055	215
1876............	2,368.	.448	2,345.17	.444	104
1877.....	2,976.33	.564	3,679.67	.697	147
1878....	3,207.33	.607	3,354.66	.635	151
	113,238.77	21.444	104,328.45	19.76	4,790

City Engineer's Report

TO

WATER COMMITTEE.

To the Joint Standing Committee on Water:—

GENTLEMEN:—In accordance with the requirements of Section 11, Chapter 68 of the City Ordinances, I would respectfully submit the following report.

There has been an abundance of water for all purposes during the past year. At no time, during the year, have we had less than 100 days supply in the Lynde Brook Reservoir.

On December 1st, 1877, the water was 11.67 feet below the roll-way, giving 298,926,131 gallons in the reservoir, an amount equal to 100 days supply. From that date until April 14th of the present year, the supply steadily increased, the water being on that date 0.77 feet above the rollway, and running over the six inch flash board 0.27 feet.

Water first commenced to run over the rollway on March 19th. On March 21st you voted to have a 6-inch flash board put on the rollway, in order to store as much water as possible.

On March 23d, I received the following note from Mayor Pratt.

CHARLES A. ALLEN, ESQ.,
CITY ENGINEER:

Is it safe for the City to put a 6-inch flash board upon the dam at Lynde brook?

Respectfully,

CHAS. B. PRATT, *Mayor.*

On the same day I sent the following reply to his Honor.

HON. CHARLES B. PRATT, *Mayor:*

Dear Sir:—Your note of to-day, asking me whether I consider it safe to put on a 6-inch flash board at the dam, is at hand. In reply I would say that I consider it perfectly safe, if the water is not allowed to flow over the board more than 8 or 10 inches. There would be no objection to allowing a greater flow over the board, if it were not for the danger of washing the top of the dam in case of high winds.

Very Respectfully yours,

C. A. ALLEN,

City Engineer.

After you had ordered on the flash board, the mill owners below, objected to having them put on.

An arrangement was made however, by which a flash board 6 inches high was kept on the rollway as long as the water was of sufficient height to render it worth while for storage purposes.

The water remained above the level of the rollway until May 24th, from which time it steadily fell until November 17th, when the water was $9\frac{48}{100}$ feet below the level of the rollway, giving a supply of 352,971,711 gallons, or sufficient to last 118 days. The rainfall through the year has been remarkably even and has undoubtedly been more beneficial to us than the same amount of rainfall coming as it ordinarily does, in the Spring and Fall months of the year. Some of our heaviest rain storms occurring in June, July and August, when they were most needed.

It is evident from the way in which the supply of water in the reservoir is affected by a few weeks without rain, that should we have a season of dry weather the supply would not be sufficient for our wants. I would therefore recommend that some action be taken the coming Winter, by which we can obtain the right to take land and construct works for an additional supply whenever it may become necessary so to do.

The Lynde Brook Reservoir dam has been visited by me regularly during the past year, and everything has been found in a most satisfactory condition.

The rollway has been repaired by building a cement wall on the west side, in place of the old slope wall, and thoroughly grouting the paving with cement mortar.

The condition of the supply in the Lynde Brook Reservoir for each day in the year, ending Dec. 1st, 1878, is given in the accompanying table.

Thanking the Committee, and the officers of the Water Department, for their uniform courtesy, I herewith most respectfully submit this report.

C. A. ALLEN,

City Engineer.

WORCESTER, Dec. 1st, 1878.

REPORT

OF THE

WATER REGISTRAR.

To the Joint Standing Committee on Water :—

Gentlemen :—I respectfully present the following report for the year ending November 30th, 1878.

There were one hundred and fifty-four (154) applications for water received during the past year, of which number all but three were granted and the service pipes laid.

Bills for water were rendered to the City Treasurer for collection, as follows :

For *Metered Water*,	5,327	amounting to	$54,342 82
" *Annual Rates*,	3,787	" "	29,319 11
Total,	9,114	" "	$83,661 93

The water was shut off from the premises of sixty takers on account of over-due, unpaid bills for water and labor furnished, and immediately turned on in cases of settlement. The number of places from which water remains shut off is four.

Abatements amounting to $9,354.29 were made, owing to change of bills from rate to meter, on account of vacant tenements, for correction of assessments and for transfer, and in accordance with orders of the Committee.

The quantity of metered water consumed during the last twelve months, ending September 30th, inclusive of waste and leakage was as follows:

From October, 1877, to April, 1878,	141,021,664	gallons.
" April, 1878, to October, 1878,	108,032,344	"
Total,	249,054,008	"

METERS.

During the year, five hundred and forty (540) meters have been placed upon the works, and the total number in use at the present time is twenty-nine hundred and sixty-three (2,963), the sizes and kinds of which are given below:

KINDS.	SIZES.								
	5-8	3-4	1 in.	1½ in.	2 in	3 in.	4 in.	6 in.	8 in.
Union (Piston)	1493	299	58	9	21	1	1	—	—
Union (Rotary)	465	14	6	3	12	—	1	1	1
Desper	521	34	2	—	—	—	—	—	—
Gem	14	—	1	—	1	—	3	—	—
Worthington	—	2	—	—	—	—	—	—	—

The Department deem the use of meters absolutely essential as a protection against waste of water. As heretofore, leakages and deliberate wastes have been disclosed which otherwise would have assumed formidable proportions. In this respect alone, meters prove valuable auxiliaries to the department.

REVENUE.

The amount of revenue actually received the past year from the sale of water was $73,673.17. Bills have been paid more promptly than the financial state of the times indicated, although the more familiar the water takers become with the rules and workings of the department, the more readily do they respond to the demands of the treasurer for payment of bills.

REMARKS.

The quality of the water, during a certain period, was of a nature not conducive to happiness among the takers, and the absurd rumors in circulation, as to the cause of the trouble, did not decrease the feeling. The Committee and officers explained as best they could, the state of things, and no knowledge of any serious results arising from the use of the water was received.

Respectfully submitted,

J. STEWART BROWN,

Registrar.

WORCESTER, December 20th, 1878.

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